



Frank A Hilario

## **THE SMART REVOLUTION**

ICRISAT Partners in Research for Development



INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS  
*Science with a human face*

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## **ICRISAT PARTNERS IN RESEARCH FOR DEVELOPMENT**

The 2nd anthology of appreciative and interpretive essays on the theory & practice of science by ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). All are original essays published between October 2007 and December 2008 online in American Chronicle as well as The Water Watcher; collected, revised and edited into this present volume.

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## **SURGING AHEAD WITH INNOVATIONS AND IMPACTS FOR THE POOR**

**O**n 11 January 2008, Team Captain & Director General of ICRISAT William D Dar came up with the memorable phrase 'The Smart Revolution' over a nice lunch in Quezon City with me and Special Consultant Santiago R Obien of the Department of Agriculture, Philippines. Below is Dar's speech during the Annual Day celebration on 16 December 2008, at ICRISAT Patancheru campus in Andhra Pradesh, India, where the Distinguished Guest was American Consul General in Hyderabad Cornelis M Keur. The address gives a bird's eye-view of the accomplishments of the Institute in 2008 and its plans for the coming years. It calls for Team ICRISAT to constantly reinvent itself even as it continues to wage The Smart Revolution for the small farmers and the poor in the semi-arid tropics. – *Frank A Hilario*



As we celebrate ICRISAT's 36th year with pride, we are witnessing unprecedented global challenges affecting international agricultural research. Soaring food and fuel prices from 2007 through mid-2008 seriously threatened the world's food, energy and political security and economic stability.

Due to this, the World Bank estimates that 100 million people have been pushed back into poverty, reducing our success during the last 7 years. With this, almost a billion people around the world are suffering from hunger today, and 9,000 children under 5 years of age die everyday due to malnutrition.

Meanwhile, climate change and desertification pose serious challenges to agricultural productivity, especially to the poor of the dry tropics. Drastic changes are also emerging in the global horizon. By 2025, experts predict that Asia, particularly China and India, will emerge on top of a multi-polar international system. Among others, they also foresee that:

- The international system will be radically altered by the current financial crisis, marking the beginning of a global economic rebalancing. The international system will be almost unrecognizable by 2025, owing to the rise of emerging powers, a globalized economy and the historic transfer of wealth from West to East.
- Unprecedented economic and population growth will put more pressure on scarce energy, food, and water resources. Due to this, the world will experience conflict over such resources.
- Strategic rivalries will likely revolve around trade, investments and technological innovations.

Nevertheless, due to the food crisis, agriculture is receiving the attention it deserves after two decades of neglect.

The recent external evaluation panel of the Consultative Group on International Agricultural Research (CGIAR) emphasized the urgent need for us to provide a long-term approach towards global food security. It also urges clear goals for sustainable food production in Sub-Saharan Africa (SSA) and the promotion of investments in agricultural research directed to small farmers and the poor. The findings of the foregoing external evaluation paved the way for the change management process now going on in the CGIAR.

In this context, we must capture opportunities to showcase our work and its impacts on the poor of the dry tropics. By doing this, we assert ICRISAT's scientific excellence and relevance. We also position its role as the apex global organization for research in semi-arid agriculture. Towards this, we have put in place Operational Research Strategies on the global development challenges of water scarcity, climate change, desertification, food and nutrition, high-value crops, and biofuels.

This year, ICRISAT released Pushkal for commercialization. Pushkal is the world's first CMS-based pigeonpea hybrid. It is drought tolerant, needs minimum inputs and produces reasonable yields under unfavorable environments. We



also inaugurated the world's first sweet sorghum decentralized crushing-cum-syrup making unit in Ibrahimbad supported by the National Agricultural Innovation Project (NAIP), Government of India. It is now a model for the rest of the world to learn from.

We have initiated operations of the NutriPlus Knowledge Center in the Agri-Science Park at ICRISAT (ASP) by signing agreements with two partners. Together with the Department of Biotechnology of India, we will establish a Platform for Translational Research on Transgenic Crops (PTTC). The PTTC will facilitate a coordinated approach in translating genetic engineering technologies for crop varieties towards product development and commercialization.

To address the availability of quality seeds to poor farmers, we scaled up activities in Sub-Saharan Africa through the West Africa Seed Alliance (WASA) and Eastern and Southern Africa Seed Alliance (ESASA). We are also waging a global media campaign to promote our flagship products and innovations.

At the System level, the CGIAR change management process is now in full gear after the CGIAR Annual General Meeting at Maputo, the capital of Mozambique. Guided by 3 strategic objectives, 'food for people, environment for people and policies for people', a new CGIAR architecture was approved. At the core of this setup is a Consortium of Centers supported by a Fund. This setup was conceived to delineate the doers from the funders of international agricultural research. The new revitalized CGIAR is expected to be up by 2010 with the organization of a Consortium Board.

Amidst the CGIAR change management process, we are currently in the midst of our External Program and Management Review (EPMR). This exercise will culminate in a report by the panel in late January next year.

As Chair of the Committee on Science and Technology of the United Nations Convention to Combat Desertification (UNCCD), we have set in motion a process to improve the committee's effectiveness in providing cutting-edge scientific knowledge and policy advice to implement the UNCCD.

Our financial health continues to grow robust with an estimated total expenditure of US\$ 42 million this year. Aiming even higher, we are targeting an annual expenditure of at least US\$ 58 million by 2015, signifying that we are doing more for the small farmers and the poor in the drylands of the world. We are very grateful for the consistent support we are getting, especially from our donors and partners like the Bill & Melinda Gates Foundation and the Government of India.

Indeed, this year yielded more feathers in ICRISAT's cap. Just like in 2006, we were again rated Outstanding by the CGIAR for our Team's work in 2007. ICRISAT's Agri-Business Incubator (ABI) also bagged Asia's Best Incubator Award given by the Asian Association of Business Incubators.

At this year's CGIAR Annual General Meeting in Maputo, ICRISAT along with 8 other Centers won the prestigious King Baudouin Award. This was made

possible through our involvement in the Collaborative Research Program for Sustainable Agricultural Production in Central Asia and the Caucasus. This is the 5th time ICRISAT is a proud recipient of the King Baudouin Award. I congratulate all scientists and partners who made this possible.

Modesty aside, Team ICRISAT has really made a difference in the lives of the small farmers and the poor people of the dry tropics of the world. Let me end by quoting US President-elect Barack Obama when he said, 'It's only when you hitch your wagon to something larger than yourself that you realize your true potential.' Along with this, we need to further elevate our work amidst our successes.

We must constantly re-grow and re-invent ICRISAT to create cutting-edge scientific innovations to empower the small farmers and the poor. ICRISAT's future is in our hands.

**William D Dar**  
Director General, ICRISAT

## THE BEAUTIFUL ADARSHA STORY

A milestone in The (Continuing) Smart Revolution being waged by ICRISAT is the story of the Adarsha Watershed project. I use the term 'Adarsha Watershed' for its two senses, the real and the virtual, because this time I wish to emphasize both. In the beautiful Adarsha story, the real was attained only after the virtual was achieved.

## **ADARSHA: THE PHYSICAL WATERSHED**

The real watershed called 'Adarsha' is found in the village of Kothapally, district of Ranga Reddy, State of Andhra Pradesh, India, some 40 km from the campus of ICRISAT. With several partners in research for development (R4D), ICRISAT has been conducting long-term watershed-based research in Adarsha to help the farmer families there improve their lives. The rallying point was the lack of water for the farms and homes in the area, hence the thrust to develop the watershed first of all. There was the urgent need to recharge the underground water table so that household wells and irrigation pumps could again spout the precious liquid for the homes and farms.

'Watershed' is not a simple idea and not easy to grasp. Suppose you bring me to a forested area and say that that is a watershed, where the headwaters of the river nearby come from, then I get the idea that the 'watershed' is 'the place for headwaters of rivers.' But suppose you take me to a wasteland devoid of trees and say that that is a watershed, then you and I have a problem. Being the technical person, you are right, of course; what about me, a poor peasant who did not even finish high school?

Simply stated, as water seeks its own level, that is, flows down, the elevated place is the watershed for the lower place. That said, there are two problems there with the unschooled mind. One, without a stream or river flowing, it cannot imagine a watershed out of a barren, dry expanse of land. Two, if it happens that there is a river or stream flowing, why is there a need to worry about the watershed?

Reading the reports on the Adarsha project of ICRISAT, I can see that to recover the watershed, the replanting of trees is not of first priority, that instead the harvesting of rainwater is of primary necessity in order to, first, recharge the underground water table and, second, to accumulate enough of the surface water for farm and home uses. The trees come later.

While I have heard and read of waterimpounding structures being built on farms in the Philippines, I have not heard of any such communal or village efforts to recover a whole area designated as a watershed as they did in Adarsha. That to me indicates that the Department of Agriculture (DA) of the Philippines, or any of the Asian and African countries, has much to learn from the Adarsha watershed experience of ICRISAT and partners. I believe that for the DA, it is important that it understands the value of the watershed for irrigation and domestic uses, where the watershed is not necessarily a still-forested or once-forested area. It has been reported that the water tables in Luzon have gone down considerably because of the continuous pumping out of water to irrigate rice and other crops, while there are no corresponding rescue efforts to replenish the dwindling liquid resource through watershed development similar to that of Adarsha in India.

## **ADARSHA: THE VIRTUAL WATERSHED**

The villagers of Adarsha did not see the value of restoring the lost watershed until the community of R4D people began to understand where the villagers were coming from. That was when the top-down approach became bottom-up. This was the turning point of the Adarsha project, the historical watershed. Today, the word 'Adarsha' has become synonymous with success in watershed development and management, arising from the productive partnership of Team ICRISAT with the farmers themselves, with the local government, and with the private sector. From then on, the project rose to higher levels. It is now a model being used in Vietnam, China and Thailand, not to mention the Philippines.

The Adarsha lesson for me is that an R4D project becomes successful after the participants in the development drama learn to share the view that the force for development must be equal parts scientists and villagers, where the advocates are only as powerful as the actors. Empowerment in reality means that power must be shared.

The Adarsha experience as a watershed in the history of R4D in the drylands I consider to be a great lesson in what is currently referred to as knowledge management, aka technology diffusion, aka technology transfer. The Adarsha success has shown that knowledge management is an equal partnership between the Knows and the Know-Nots, that technology diffusion is an equal effort between the 'sellers' and 'buyers' of technology, that technology transfer is only for early adopters who are the well-off farmers and therefore cannot make a huge difference with the poor farmers.

Also learning from some of those it is supposed to teach, and following those it is supposed to lead, ICRISAT is engaged in The Smart Revolution. I believe the term 'The Smart Revolution' captures well ICRISAT's purpose, plan and process since Team Captain & Director General William Dollente Dar took over the Institute in January 2000. 'The Smart Revolution' (Dar's term), as contained in this book, can be seen as a bird's eye-view of the past 9 years as well as for the next 10 years. The Smart Revolution includes Dar's call for the Institute to continue reinventing itself, to innovate, without leaving behind its target clients.

In my first book commissioned by ICRISAT entitled *Team ICRISAT Champions the Poor* (2007), I emphasized the pro-poor stance of the Institute as far as the semi-arid tropics (SAT) of the world are concerned. After all, the SAT is where millions of poor farmers live.

In this second book, *The Smart Revolution: ICRISAT Partners in Research for Development*, the complete title indicates that this time, the Institute wants to focus on the need for radical changes in agriculture in the SAT considering the phenomenon of global warming. Equally important, ICRISAT by itself cannot wage The Smart Revolution without partners in research for development.

I know the Institute gratefully acknowledges its debt to its R4D partners as well as donors.

I salute Team ICRISAT and partners for a year of achievements; 2008 has turned out to be a watershed year for all. Keep up the good work, Team!

## CREATIVE CAPITALISM & THE SMART REVOLUTION

**O**n his part, Bill Gates, immediate and illustrious past Chair of Microsoft Corporation, surprised the world and at the same time disturbed the complacency of the capitalists by coming up with his revolutionary concept he calls Creative Capitalism in July 2008. It is a revolutionary idea whose time has come.





On his part, William Dar, Team Captain & Director General of ICRISAT came up with the concept of The Smart Revolution in a Manila restaurant where I thanked him personally for commissioning me to write a book of essays on ICRISAT, and the talk shifted to what he referred to as 'smart crops.' I thought that was smart.

A year later, 2008, I can see that The Smart Revolution can be a beautiful handmaiden of Creative Capitalism.

Now then, by way of enumeration, the way I see it, The Smart Revolution can be seen as essentially ICRISAT performing any and all of these 7 activities in the lab and in the field at any one time:

- (1) Creating smart crops
- (2) Developing smart technologies
- (3) Engendering smart institutional partnerships
- (4) Generating smart people advocacy
- (5) Inspiring smart global & local policy support
- (6) Humanizing knowledge management
- (7) Attracting investors in development.

The crops must be smart, that is to say, able to stand stresses such as pests, diseases, drought, and waterlogging. Such crops will reduce the inherent risks attached to agriculture.

The technologies must be smart, that is to say, both affordable and appropriate, both excellent and relevant. If the technology is expensive, it's probably because it's complicated; if the technology is relevant but not excellent, it needs further development.

The institutional partnerships must be smart, that is to say, synergistic. In a very real sense, a synergistic relationship among partners enables them to enjoy economies of scale of operations.

The people advocacy must be smart, that is to say, empowering. The target clients of the R4D people must be taught to help themselves and discouraged from a mendicant attitude, from a helpless frame of mind.

The global & local policy support must be smart, that is to say, in accordance with the concept of sustainable development in the long term.

The knowledge management must be smart, that is to say, excellent and relevant. Above all, it must be user-friendly in all senses, the language used being that of the knowledge user, not the knowledge manager.

Investments in development must be shown to be smart, that is to say, within the realm of Creative Capitalism. Creative Capitalism is pro-poor, and so is The Smart Revolution. Gates proposes that capital be invested in the interest of the poor where the benefits to the capitalist may be only goodwill

and not cold cash. The Smart Revolution proposes that the funds for R4D be expended in the interest of the poor where the benefits to both the donors and recipients are both political will and cold cash. Political will is otherwise known as empowerment; no will, no cash. The Haves must help the Have-Nots; the Have-Nots must in turn help themselves.

In fact, within the purview of Creative Capitalism, R4D institutions such as those within the aegis of the CGIAR are encouraged to apply creative science, as it were, partnering for productivity with public and private donors and investors. In that sense, the ABI initiative of ICRISAT is creative science, an expression of The Smart Revolution. It is a type of project that capitalists should be looking for. If they're smart enough.



**BILL GATES,  
NOBEL PRIZE FOR ECONOMICS 2008!  
WELL HE INSPIRES US TO CREATIVE SCIENCE**



**24** January 2008, Bill Gates, Chair of Microsoft Corp, speaks at the World Economic Forum in Davos, Switzerland and proposes an outstanding but what looks like an outrageous, capitalist idea, that which he calls 'Creative Capitalism.' Afterwards, people talk about it but no one is about to congratulate him for that one flash of genius in a hundred years. I will now. I don't know Microsoft's Bill Gates to be an innovator in the sense of Apple's Steve Jobs brainstorming an iPod, but this time he wins my Nobel Prize for Economics 2008.

Creative Capitalism is throwing big money after little moneys to make good, better, best. Thinking globally, acting locally. 'Economic demand is not the same as economic need,' Bill Gates says. Hear that David Ricardo, John Maynard Keynes? Demand is finite because that's what we make it. Creative Capitalism is creating demand where there has only been need, creating a market where there has only been a longing. Thinking locally, acting globally. Turning the economic globe upside down. With creativity, Bill Gates redefines capitalism – and thereby contrasts it with socialism – as more of the interests of the poor rather than the rich. From each according to one's ability, to each according to one's demand.

In trying to explain Creative Capitalism, economists Tracy Williams, Michael Deich & Josh Daniel start by saying they do not believe that companies will ever 'forsake protectionism.' (Because the big are afraid of the small?) They do not expect them to act in ways 'inconsistent with their self-interest.' (Because the big can't think outside their box? Because the big can't look beyond their net?) Rather, they say, 'Creative Capitalism starts from a fundamentally different premise – working with the incentives faced by business to find common ground between their interests and those of the poor' (creativecapitalism.typepad.com). You make the poor your market. Poor you if you can't think a thing. But how? That's creativity.

In his Davos speech, Bill Gates explains Creative Capitalism as 'an approach where governments, businesses and nonprofits work together to stretch the reach of market forces so that more people can make a profit, or gain recognition, doing work that eases the world's inequities.'

Isn't that what science is? A force for good for more people to profit from, or be known by, by doing what doesn't come naturally, that is, helping more of the poor. By Bill Gates' definition, science is supposed to be creative science all along!

In a press release dated 25 October 2008, Director General William Dar advocates for poor farmers in Asia, Africa and America their own 'policy, institutional and financial bailouts.' He doesn't mean a massive bailout of the 1 billion poor of the world, which is 15.15% of the 6.6 billion global population as of July 2008. By 'bailout,' he does not mean 'doleout' either – rather, he means 'assistance.' Probably thinking of the US\$ 85 billion bailout of the US #1, American Insurance Group (AIG), if the rich deserve assistance, 'who,

The Agri-Business Incubator (ABI) of ICRISAT is in the right direction toward Creative Capitalism, an idea whose time has come.

more than the poor, has a right to substantial assistance from governments?' Dar asks.

For 'substantial assistance,' Dar mentions supports in terms of income, policy, infrastructure, access to higher quality inputs (including seeds), irrigation, and institutions. A big bailout like that for the AIG is to prevent a domino effect of multiplying enterprises that will collapse, resulting in the collapse of the whole economy; small bailouts such as subsidized high-quality seeds and subsidized incomes for poor farmers are precisely to create an opposite domino effect, the multiplier effect, that of multiplying enterprises that will build up the whole economy. Perhaps only the US can afford king-size bailouts; all other governments, especially those of the developing countries, can afford only small farmer-size bailouts. Enough is enough.

While developing capitalist countries get more wealth from agriculture, Dar says, they expend less wealth for agriculture. They get 50% of their Gross Domestic Product from agriculture; they budget only 10% of their public spending for it. I see this is not a capitalist contradiction; I believe it is merely logical capitalism – the capitalist doesn't believe that if one puts more inputs in it, one will multiply the outputs a hundredfold. Because agriculture is a risky business.

To make my overall discussion of agriculture less unwieldy, I will stick to crop production and leave out here animal husbandry. I see these risks in crop farming:

- Typhoons – One typhoon can reduce a whole crop to zero value.
- Lack of soil moisture – This can be brought about by unpredictable rains or inadequate supply of irrigation water, among other things.
- Insect pests – These can eat up farm profits.
- Crop diseases – Diseases reduce yields by 50% or more.
- High costs of inputs – Fertilizers and pesticides make up the bulk of expenditures in crop farming. When their prices go up, the farmer's income goes down.
- Exposure to pesticides – The modern farmer fights insect pests and diseases with pesticides, in carelessness exposing one's body to the toxic chemicals. Any such exposure is always unhealthy, sometimes deadly.
- Pollution of environment – The great misuse of chemical fertilizers and pesticides results in the great increase in the pollution of the environment.

So, as I see it, low investment in agriculture by developing countries is their way of reducing the risks from crop farming. Because they are not thinking creative science.

Borrowing from Bill Gates, creative science is throwing big ideas after little ideas to make good, better, best. Science can learn from that to create and consequently diffuse more technologies.

So: Think creative science. So: There are better ways of mitigating risks in crop agriculture. This list is what I have so far gathered from my current understanding of the scientific literature coming from ICRISAT:

- Choose varieties that can stand adverse weather
- Raise crops that are stingy on soil moisture
- Plant insect-resistant crops
- Cultivate disease-resistant varieties
- Practice low-input high-output farming
- If you have to spray, follow safety precautions
- Better still, learn integrated pest management (IPM).

On the whole, the advanced varieties they have of the 5 mandate crops of ICRISAT – sorghum, pearl millet, pigeonpea, chickpea and peanut (groundnut) – are misers on soil moisture. Team ICRISAT has been developing crop varieties that do not easily succumb to the attacks of pests and diseases. Also, Team ICRISAT has been coming up with techniques that produce more for less, like less fertilizer to apply – tiny doses of fertilizer on the seeds, not the soil – it calls it microdosing (the technique is new, the term is not). Invented earlier in Asia, probably by Filipinos, IPM requires natural insect and disease control techniques and reduces the use of chemicals.

It stands to reason. The crops that can withstand moisture stress – those that thrive on the drylands – can withstand the attack of insects and disease-causing bacteria, fungi and viruses, more than the crops that rely on irrigation to survive.

Yet, even all that high productivity is not enough for the small farmers who are powerless against those who exploit them in production, processing and marketing. Such as the implosive power of 5-6: For you to buy your fertilizer, for every 5 I lend you, you owe me 6 everyday until you are able to pay back. Or I loan you what you need for pesticides, but you sell me what you harvest right after harvest, and I dictate the price. Captive market? No, buyer's market.

Creative science is for scientists to do something more than just increase yields – they must help decrease cash outflows and increase cash inflows. You can increase the income of farmers given the same crops and yields if you just shield them from the exploitation of iniquitous people who manipulate economic forces for their selfish reasons. Those uncreative capitalists!

Given all that, I propose that scientists in research institutes and academicians in universities also engage themselves in the study of creative crop husbandry, not to mention creative animal husbandry, leading to Creative Capitalism. I propose that they do applied research and find common ground among the interests of what I shall call here the Four Sides of Creative Capitalism: Local Government, Local NGO, Local Rich and Local Poor – so that there is work and profit and recognition on all 4 sides.



The Agri-Business Incubator of ICRISAT is in the right direction toward Creative Capitalism, an idea whose time has come. And so I'm not surprised that, ABI-ICRISAT has won the highest recognition from the Asian Association of Business Incubators (AABI) – The AABI Incubator of the Year Award 2008. Congratulations, Team ICRISAT!

And Bill Gates, thanks! for a radical idea that opens many windows of opportunity and displays many a vista of social progress never before seen in the parallel real and virtual universes. A Brave New World.

*– Published 27 October 2008 in American Chronicle*



## **RATED O TWICE! WHEN DROUGHT COMES, CAN ICRISAT BE FAR BEHIND?**



**S**hould you work for the ratings like the TV networks do? Only if, I say, the criteria for the ratings require that you work so that others can actually work for themselves. Empowerment. Can you do that in business? You should. Can you do that in science? They're doing it now. That's when I say when the Filipino is good, he is twice good. That's William Dar, from Santa Maria, Ilocos Sur, Northern Philippines. That's when I say when an international research institute is good, it's a winner twice in a row. That's ICRISAT; William Dar is its Director General and they have just been rated Outstanding by the CGIAR. This is an unprecedented repeat; at about the same time, they were rated O last year, 2007. They're in rarefied air.

Again, the World Bank approves. When a CGIAR center is rated O, the Bank gifts that center with \$1 million as reward for an excellent mission accomplished. That's like being paid \$ 2,739.73 every day for 365 days, for a job that has to be well-done 24/7. A tough act to follow. The World Bank is a sponsor of the CGIAR, along with FAO and UNDP; traditionally, a Vice President of the Bank serves as CGIAR Chair. The CGIAR is the world's largest agricultural research network, dedicated to improving food crops, reducing hunger, and promoting the sound management of natural resources throughout the developing world. A tougher act to follow.

I said 'mission accomplished' because being rated O by the CGIAR is a Class Act, not for a single outstanding performance in a major role, even if William Dar is that good. They call themselves Team ICRISAT not for nothing – all for one, one for all.

They have to be a team – divided, they fail; united, they succeed. To be rated O, Team ICRISAT had to deliver high-quality outputs, outcomes and impacts as one institution performing a great myriad of acts taken together. These are the actual ratings:

- 96% for outputs and output targets achieved
- 6.00 for outcomes assessed on a scale of 1 to 10
- 7.30 for commitment to document impacts on a scale of 1 to 10
- 8.55 for overall impact assessed on a scale of 1 to 10
- 2.43 peer-reviewed publications per scientist
- 49% publications with developed country partners.

To differentiate, I understand output is the knowledge gained; outcome is the result of the output applied; impact is the benefit or damage arising from the outcome. Example – Output: Sweet sorghum is good for producing ethanol. Outcome: 91.7% of the sweet sorghum sugar is transformed into ethanol. Impact: The farmer earns more from sweet sorghum than grain sorghum.

Ninety six percent for achievement is great! Now, if you add the ratings for the next 3 criteria, it's 21.85 out of a possible 30, or an overall rating of 72.8%; that's not so great, is it? The numbers mean that outcomes and impacts are the areas where Team ICRISAT stand to accomplish much more if they want to. My suggestion is to focus more on relevance, that which I believe my beloved alma mater the University of the Philippines itself has been neglecting all those 100 years of her existence. 'Relevance,' according to my favorite, the American Heritage Dictionary, is 'pertinence to the matter at hand' and 'applicability to social issues.'

With ICRISAT, there is also more to be desired with only 2.43 publications per scientist, and 49% papers co-published with authors in developed countries, given that there are 365 days a year. I know many a local and international

institution whose computers have the speed of light but whose computer users have the speed of heavy. I'm not surprised. It's not the intelligence of the software users; it's the intelligence of the software programmers. Unlike the programming minds of Apple Computer (Steve Jobs & Company), those of Microsoft and IBM and OpenOffice.org have not made easier the life of software users like me. So, in publishing, even with high-tech computer systems, each delay is a hard fact to swallow. My suggestion is to focus more on how to increase publishing quantity along with how to increase publishing quality. There is no other way but to master the software, even while the software insists on being the master. It's complicated.

And since we're at it, let me tell you that yes, even in technical publications, a little more imagination wouldn't hurt anyone. I should know. I have been professionally editing technical papers for the last 33 years, since 1975. For instance, you don't have to be technical and boring at the same time. Now, did you know that even Microsoft Word can teach you the use of the active voice? And you don't have to labor over errors in grammar, as Word 2003 has the grammar checker (and adviser), and using the same software someone can build a dictionary of terms for you so that the next time you type, you get an instant suggested (correct) spelling of a technical term (not to mention any scientific name or some other difficult name). In software, a little more knowledge goes a much longer way.

Aside from the 2007 outputs and impacts, Team ICRISAT had to show financial health:

- 171 for short-term solvency (liquidity) in a range of 90-120 days
- 114 for long-term financial stability in a range of 75-90 days
- 23 for efficiency of operations (indirect cost ratio)
- 0.27 cash management on restricted operations.

Don't ask me what those economic indicators mean; what I'm sure is that they were good enough for the performance auditors to declare ICRISAT a Champion CGIAR center the second time around.

My suggestion is to focus more on how to increase publishing quantity along with how to increase publishing quality. There is no other way but to master the software, even while the software insists on being the master. It's complicated.

Actually, there are quite a few more in the list of criteria for being Rated O by the CGIAR. But right now, I'm more interested in seeing as to whether ICRISAT is good enough for you if you were an extension agent, or advocate, or investor in science, or donor. What's in it for the farmers?

ICRISAT's territory is the SAT (semi-arid tropics), home to one-sixth of the world's population. Drought is a common occurrence there; what has ICRISAT learned in its 36 years of work, but especially in the last 8 years under William Dar? Here's what I have learned reading ICRISAT -- that the dryland farmers in the Philippines and elsewhere can do to derive as much benefit from their labors as they deserve:

- **Do as the Kenyans do.** This June, the VOA reported that the pigeonpea from ICRISAT was the only crop that survived the severe drought in Kenya (Annual Report 2007, [icrisat.org](http://icrisat.org)). 'Pigeonpea demonstrated its superiority during a severe drought – several families we visited survived solely on pigeonpea as it was the only crop that made it in the fields.' Survivor Kenya.
- **Plant a crop as smart as you are.** Sweet sorghum is a smart crop because it can grow either with too little water, too much water, or in-between. It has many uses: food (grains for humans), feed (grains for animals), fodder (stalk for animals), forage (leaves & stalk for animals), fertilizer (stalk & leaves for the soil), and fuels (stalk for ethanol for cars and homes). My sweet sorghum is smarter than your sweet corn.
- **Catch the rain.** Team ICRISAT learned from the catchers of rain of Raj Samadhiyala who learned from their village head, Sri Hardevsingh Jadeja. They learned to trap the rain into water tanks for their homes, into ponds to recharge their water wells, through check dams and dikes to recharge their underground water. They learned to help the water cycle do its job. Don't let the rain catch you not paying attention.
- **Save water.** More than 50 years ago, I was helping out my father work our 3 fields for rice, about 2 hectares total; in all of some 40 years afterwards before he died, I don't remember ever hearing him talk about saving irrigation water, and he was an Ilocano. Filipino farmers have always been profligate about water, and I have always wondered why. They don't irrigate the rice field – they flood it. The farmers upstream of the irrigation system keep the water in the bunds for days, never mind the farmers downstream waiting to flood their own fields. And some farmers have paid with their lives for this sorry practice. And I don't think my alma mater, the College of Agriculture of the University of the Philippines Los Baños, knew any better. It's not too late to learn from the Indian farmers who know several hows to harvest and conserve water: gully plug, loose boulder assembly, gabion, sunken pond, check dam, field bund (SP Wani et al. 2007, Report #36, [icrisat.org](http://icrisat.org)). When you harvest water, you harvest much more.



- **Save fertilizer.** ICRISAT (along with IFDC, CIAT/TSBF and other partners) have developed the technique they call microdosing, that is, applying a 3-finger pinch of fertilizer (about 2 gm) per hole or hill (icrisat.org). That has reduced the fertilizer need by 67%, from 60 kg to 20 kg per hectare, while it increased the yield up to 120% in sorghum and pearl millet. Good mathematics, great economics.
- **Plant early.** To catch the remaining moisture in the field after rice and avoid the drought after the rainy season, soon after rice plant an early-maturing crop like the super-early, double-pod chickpea variety ICCV 96029 from ICRISAT, which matures in 75-80 days (Annual Report 2007, icrisat.org). The early bird catches even the last worm.
- **Be part of a team.** In Tanzania, farmers have learned much more than to plant improved varieties of pigeonpea from ICRISAT – they have learned to produce the improved seeds through PMGs (producer marketing groups), which also facilitate access to seeds and other inputs, as well as access to market. Benefiting the farmers instead of the middlemen, the PMGs have managed to increase local prices by up to 25% in drought-prone Nairobi and Mombassa (Annual Report 2007, icrisat.org). If the producers are themselves the middlemen, there are no middlemen. If a farmer is not part of a team, he is a part of the problem he cannot solve by himself.

And yes, the dryland women farmers can learn from the women of Kenya, who learned from the field days held at ICRISAT/KARI research station in Kiboko. Now the women call pigeonpea ‘our dryland coffee’ one time and ‘our beef’ another time, alluding to its high protein content (Annual Report 2007, icrisat.org). Not only that, the women farmers of Kenya have discovered fresh vegetable pigeonpea; the demand for green peas is so high that they fetch prices almost twice those of dry peas. Jane Mulinge, mother of 8, is planning to expand her 4 acres to 6 acres in the next season. Priscilla Mutie, another mother of 8 (with orphans), says, ‘I have proudly learned that 1 bag of pigeonpea can buy 2 bags of maize.’ Her pigeonpea is twice better than your corn.

*The Kenyan women farmers are telling us about the value of innovation.*

*The Tanzanian men farmers are telling us about the value of access.*

*In fact, with ICRISAT, they are teaching us about  
the value of science,*

*that when it's good,*

*it's of the people,*

*for the people,*

*by the people.*

*– Published 4 September 2008 in American Chronicle*





## **WATER LESSONS OF ADARSHA. LEARNING BEGAN WITH WHAT SCIENTISTS DIDN'T KNOW**



**T**o India, and then to learn? I've never been out of the Philippines, and here I am, looking into mirrors. Which images are real, which ones are my prejudices? Samuel Martin is a friend of mine; I like Mahatma Gandhi; I like Bugong chicken (not Indian); I never liked curry, Indian or not. Now, I'm in Andhra Pradesh. Ruled by different dynasties and empires over the centuries, Andhra Pradesh became for cultures a melting pot – and the Rice Bowl of India. Sometimes, I like to mix my metaphors.



Visited by modern peoples and modern technologies, empires of the realm and empires of the mind, India has become two hugely real and virtual kingdoms herself. India is now mammoth in size, in success, in science too. I like what I see, including home-grown Informatics and creative-capitalist Microsoft in India. If we don't make a paradigm shift, history makes the shift for us – or a genius does it, like Bill Gates.

And the performing arts of India: I've just watched two performances of the Andhra Pradesh state dance, the Kuchipudi. The young dancers, all girls, are a rapture to watch. I understand the dance originated in 300 BC circa, an ancient artifact; I like it, as I'm an antique myself at 68. Life likes like. There was a time when Kuchipudi was a bastion of Indian male imperialism, biased for the stronger sex, no girls allowed, but Maestro Vedanta Lakshmi Narayana Sastry shoved in delighted and delightful female dancers onstage, I am told. Mix the girls with the boys and what do you expect? You get life. So the world of Kuchipudi has never been the same again. The new learns from the old; the old gains from the new. I say this is change we can all believe in.

Trying to imbibe some of the art and science of India, I find I must apologize. Even as I write and listen and think, I perceive India with the partiality of a foreigner, even as I perceive my country the Philippines with the partiality of a native. Of course I have a bias, and my bias is extension. I see extension as education for adults, out-of school or not, literate or not, informed or misinformed, computer literate or idiot. And yes, I have learned to look with rose-colored extension glasses, the better to see.

And so, to extension in India, to the highly successful Adarsha Watershed Project of Team ICRISAT. In this context, I must make mention of ICRISAT partners in this winner of a project: Central Research Institute for Dryland Agriculture (CRIDA) in Hyderabad, District Water Management Agency (DWMA) in Ranga Reddy District, Government of Andhra Pradesh in Hyderabad, Drought Prone Areas Programme (DPAP), Farmers' Watershed Association, M Venkatarangiaya Foundation (MVF) in Secunderabad, and National Remote Sensing Agency (NRSA). Credit must be given to whom credit is due.

Now, what exactly are we giving them credit for? Or, to put it another way, how do you explain the extension success called Adarsha? I like to ask questions, then look for the answers myself.

But in fact, Adarsha the place is an invention of those Indian villagers. Adarsha wasn't there in 1999 when the watershed team went looking for a place to do their science on, looking for people to motivate to do what they think they ought to do, among other things, bring back water to their homes and farms, when all they could see was the lack of water, a dryland of 465 ha in that village of 1,500 comprised of 270 farm families and 4 others. This is South India, remember? You are in the semi-arid tropics. Average landholding of Adarsha farmers is 1.4 ha – they are land-richer than many Filipino farmers, but equally disadvantaged by their own historic profligate water habits at home and on the

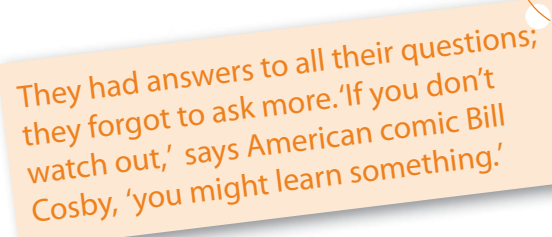
farm. Like, they over-irrigate. Like, they do not maintain a vegetative cover for their soils throughout the year. Like, they over-cultivate so that the soil runs off with the rainwater, eloping with the nutrients. Farmer bias for clean culture, cultivator bias for modern agriculture.

When the Adarsha project started, it was the farmers who decided to name the place Adarsha, their watershed, in the village of Kothapally in Ranga Reddy, a district in Andhra Pradesh. The village is about 40 km from the campus of ICRISAT. Adarsha is a baby name for a girl; the name refers to an ideal, a model, something to aim for. The first goal of the Adarsha project was to have water for the farms and homes in that village, to avoid the drought. More water in more months of the year. And they were rewarded with success.

Success was followed by imitation, the sincerest form of flattery. So, as of last report, the Adarsha model was being tried in other water-challenged parts of India as well as in Vietnam and Thailand. The Department for International Development (DFID) of UK and the Andhra Pradesh Rural Livelihoods Programme (APRLP) had provided funds to scale up the methodology in Kurnool, Nalgonda and Mahbubnagar Districts of Andhra Pradesh. The Sir Dorabji Tata Trust of Mumbai and the Asian Development Bank (ADB) had also funded the Adarsha stratagem in Madhya Pradesh and Gujarat in India, and in Thailand and Vietnam.

Like I warned you, scientists have their own predispositions about extension. Two members of Team ICRISAT looked at their Adarsha success and came up with two subtly different versions on how to explain the accomplishment, or what mainly to ascribe it to, and it's easy to agree with both of them. It happens even in science. With our individual biases, each of us is any of the 6 blind men of India groping in the dark trying to find out how the elephant really looks like. It takes all eyes.

I want to more than just grope for details here. You see, I'm interested in the process, in the how it happened that this watershed project succeeded where others elsewhere failed. But since there is yet no process documentation of the Adarsha phenomenon that it is, I'll just have to content myself with two ICRISAT reports: 'Farmer-Participatory Integrated Watershed Management: Adarsha Watershed, Kothapally, India – An Innovative and Upscalable Approach' (2003)



They had answers to all their questions; they forgot to ask more. 'If you don't watch out,' says American comic Bill Cosby, 'you might learn something.'

by SP Wani, HP Singh, TK Sreedevi, P Pathak, TJ Rego, B Shiferaw and SR Iyer, and 'Adarsha Watershed in Kothapally: Understanding the Drivers of Higher Impact' (2004) by TK Sreedevi, B Shiferaw and SP Wani, as well as a news item on the project by Sushmita Malaviya ('Worms of change,' 2003, Sunday Tribune, India). 2003, 2004: These are old news, you protest. So they are. So now I borrow from the Reader's Digest and do declare that these are 'articles of lasting interest and enduring significance.' The good news of science can last a lifetime. That's why the Reader's Digest has lasted a lifetime.

Nine years and Adarsha has been an unqualified success. If you need audiovisual proof, ask BBC World for the documentary they made of it. (I don't doubt it. Blessed are those that have not seen and yet have believed.)

MVF was there for the youth, for education. Eventually, the Adarsha villagers learned their lessons. As a teacher, I specially note the part of Hadley Nelles' Adarsha report that says, 'Now, when a child is born, there is no question of whether or not it will attend school, it will; if not by the parents' own decision then by the pressure of a community well aware that a child's place is the classroom' ([ideas.repec.org](http://ideas.repec.org)) and not in a dangerous situation. Now I see that in Adarsha, if education does not begin at home, the parents have a lot of explaining to do!

The rest of the Adarsha project partners were there minding the technical details. Are we reducing runoff and soil loss? Check. Are the ladies contributing organic fertilizer with their worms? Check. (They're into vermicomposting.) Are the *Gliricidia* loppings enriching the soil with N? Check. Have we improved the groundwater level yet? Check. Have we improved the land cover and vegetation yet? Check. Have we increased productivity yet? Check. Have we increased family incomes yet? Check. Do we have water while the other villages don't? Check!

Great. So, how now do you explain the Adarsha success?

On one side, ICRISAT Scientist (Watershed Development) TK Sreedevi ascribes the Adarsha success to the use of a 'farmer-centric integrated watershed management model' – the farmer is the heart of the process. This is an extension view where the science of the watershed meets the needs of the farmers who supply the needs of the wasteland: water conservation measures and structures. Education begins with the first drop of rain. When the farmers did it on the wasteland, they did it on themselves – building gully control structures, mini percolation pits, diversion bund, field bunds, check dams, gabions. All these watering holes conserved water that replenished the groundwater that fed the wells and water holes the farmers used for their homes and farms. What goes down must come up.

On the other side, ICRISAT Principal Scientist (Watersheds) SP Wani ascribes the Adarsha success to a 'farmer-participatory consortium model' – the farmer is consulted. This is an extension view where the emphasis is 'on capacity-building and empowerment of the NGOs, extension workers, farmers, and

SHGs' (self-help groups). As a result, hopes soared, incomes rose, attendance to schools increased, more women contributed income to more households, there was more water for the homes and farms, farmers planted better crop varieties, spent less on farming (fertilizers and pesticides) and earned more, and the countryside became literally greener. The project helped the Adarsha villagers help themselves.

'Farmer-centric' or 'farmer-participatory' – I think the difference is trivial.

Ah, but did you know? The Adarsha project did not start right. ICRISAT Soil Scientist Pyara Singh tells us how it was at the beginning of Adarsha, 'that earlier, the approach to work in these villages had been very top-down, with an emphasis on soil and water conservation and little people's participation' (Sushmita Malaviya, 2003, [tribuneindia.com](http://tribuneindia.com)). That is to say, the scientists went to Adarsha armed with their knowledge on waters and watersheds, where with they went to work without bothering to ask other questions. They had answers to all their questions; they forgot to ask more. 'If you don't watch out,' says American comic Bill Cosby, 'you might learn something.' And so they did. And so in time, the Adarsha scientists learned from their Adarsha experience. Better late than never! Must be bottom-up. When working for people working with the soil, you begin with soiled hands, but not those of the scientists.

I do believe the views of Sreedevi & Co and SP Wani & Co all boil down to only one and the same word, empowerment, to borrow from SP Wani.

I appreciate that. But then I ask: How? Remember, my bias is in the process, not the product of extension. How did it happen that the Adarsha villagers were empowered? The way I see it, empowerment is not given – rather, it is exercised. The Adarsha scientists and sponsors provided TIME (temporal attention, information, materials, methods, money, experience, energy, efficiency, etc) to the Adarsha villagers who then went on to empower themselves. The new learned from the old; the old gained from the new.

Like love, power is not a noun – it's a verb. Like a right, you have to take power upon yourself; you have to exercise it. It was not the TIME that empowered them; the people empowered themselves. At one point they just went ahead and did it, took it upon themselves. It does not always happen that when you give people TIME, they empower themselves.

Team ICRISAT must have done something right. But how exactly do you initiate the process of empowerment? As an extension scholar, I'd like to know who, with whom, what, where, when, how and why. So, to India, and then to learn.

– Published 2 November 2008 in *American Chronicle*







## 2ND RED REVOLUTION. RED NUTS GROW ON BADLANDS



**T**his is the story of another Red Revolution, and this time it happened in India when we weren't paying attention (at least, it escaped mine), in 2006 yet. Just like the original Red Revolution, that is, the Chinese variety created, launched 40 years ago in 1966 and nurtured with the leadership of Mao Tse Tung, the Indian variety has involved and/or directly affected at least 1 million peasants. And both Revolutions are cultural in nature. Cultural, something to do with society; the Chinese Cultural Revolution involved the whole of China. Cultural, something to do with cultivation; the Indian Cultural Revolution involves the farmers mainly, about a million of them. One is social, the other is technological. I think technological is safer.

This 2nd Red Revolution derives its name from the fact that it has been occurring on the red soils of India. What do the farmers culture on these badlands and is not peanut? Ask that question and different farmers of Anantapur in Andhra Pradesh will probably give you only one answer: 'Groundnut,' specifically 'ICGV 91114,' the name given by the plant breeders who introduced it to the groundnut farmers. I'll call it instead the Red Nut, because I find it difficult to memorize a code with 4 letters and 5 digits and no clue. With 'ICGV 91114' I'm clueless.

So the Red Nut turns out to be a new groundnut variety (I suppose the GV in the code name and IC stands for ICRISAT). With the Red Nut, the CGIAR is truly a revolutionary force in R4D. We can expect more. The Red Nut was developed by ICRISAT with funding from International Fund for Agriculture and Development (IFAD) and with partnership from the Acharya NG Ranga Agricultural Research University (ANGRAU) and Rural Development Trust (RDT), an NGO (icrisat.org). It's groundnuts to the Indians; it's peanuts to me, a Filipino.

Names. What's in a name? In science, that which we call a rose may be another species. Watch your language now. It's botanical. It's *Arachis hypogaea* Linnaeus, the name botanists give for groundnut. Let me deconstruct that name: 'Arachis' refers to the roots with pods that look like many legs of a spider (Arachne), 'hypo' means 'below' or 'under' and 'gaea' (also 'gaia') means 'Earth' – literally, 'the underground spider.' The groundnut. For accuracy of ID, the taxonomists like to Latinize the names of specific plants, because Latin is a dead language – the meanings will never change. So, by technical nomenclature, that 1st word (genus) combined with that 2nd word (species) is the complete botanical name for groundnut; that 3rd word is in reference to the man who gave that botanical name after describing the species in an appropriate technical paper, the Swedish Carl Linnaeus, Father of Taxonomy. And once in a while, old taxonomy comes with new technology, like *Arachis hypogaea* cv 'Red Nut,' meaning this is a new cultivar (cultivated variety). The scientists take so much pain to ID a plant so that it cannot be mistaken for some other. That's theory; I like theory. The farmers are more practical – not wanting to complicate their lives, they will give a name like 'Red Nut' and leave it at that. That's practice; I like practice more.

In India (Anantapur), the soils are gravelly red, dry and hardly visited by rain. In the season of rain, or lack of it, the Indian farmers have been choosing to plant groundnut, especially the Red Nut, since 2006. In the Philippines (Los Baños), the soils are loamy, dark brown, moist and regularly visited by rain. In the season of rain, the Filipino farmers prefer to plant rice, now especially the IR64, since 1985. Problems are global, cropping is local.

In 2006, ICRISAT announced that it had initiated a 'Groundnut Revolution' in India, beginning in Anantapur district. There, the Institute had successfully cultivated a partnership among ICRISAT, Indian farmers and seed producers where none grew before. A Revolution involves Leadership (leaders acting

as a single team), Partnership (agencies acting as one), and Followership (followers acting as one cohesive group). They have it all in Anantapur. (A lesson from my country: I'm thinking of politics in the Philippines, where most anybody wants to be the Leader, so no Peaceful Revolution can be waged, only Peaceful Involution.)

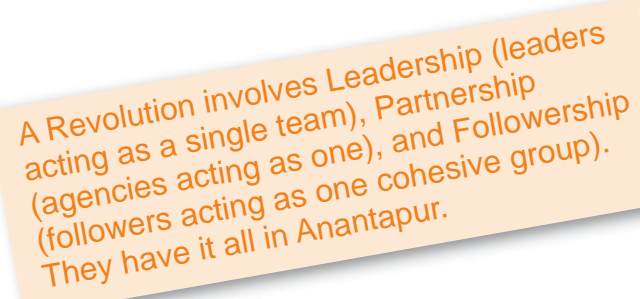
Why peanut? The Indian farmers have been growing this crop since they can remember. 'Farmers there prefer groundnut as it survives on rough terrain under uncertain rainfall,' says Team Captain and ICRISAT Director General William Dar. In this part of India, rainfall is always uncertain. Fortunately, this crop can survive 50 dry days, 10 days short of 2 months. 'When the rains return,' says Dar, 'the crop rises Phoenix-like from under the gravelly soil,' or what passes as soil, and the farmers know they will be harvesting the nuts to feed the market and they will be gathering the fodder to feed their animals. The Lord serves also those who only plant and wait.

The growers of Anantapur love the crop so much they don't just grow groundnut in their few acres of barren ground – they grow it in 1 million hectares in a good year, that is, with the promise of rain. Now, with the Red Nut, they can grow more optimistic.

Interestingly, when ICRISAT partners and farmers were comparing the field performance of the Red Nut with IC8 (ICGV 89104) and TMV 2 groundnuts in 2003, the severe drought that year literally put the varieties to the test. The Red Nut came out the winner with more and heavier seeds. So the Anantapur farmers and the private sector bought into the Red Nut. Five years later, earning more, their cattle producing more milk from the fodder, the farmers have virtually forgotten IC8 and TMV 2. Nothing is more memorable than success.

Now, the basic lesson I get from all of the above is that if you can't solve a problem, change the problem. Like, if your farm has lack of water, grow a crop that lives on lack of water. That's the Anantapur lesson from ICRISAT. And it's a very good one.

But I'm a farmer's son, so I hope Team ICRISAT will do more. I'm also a Christian and doesn't the Bible say, from those who have more, more will be expected of them?



A Revolution involves Leadership (leaders acting as a single team), Partnership (agencies acting as one), and Followership (followers acting as one cohesive group). They have it all in Anantapur.

Now then, changing the problem again, I have two what-ifs to add if I were a farmer and wanted to be an active participant in the waging of the 2nd Red Revolution:

- (1) What if I wanted to change the soil?
- (2) What if I wanted to change the crop?

## **(1) MORE RED REVOLUTION: CHANGING THE SOIL**

'Creativity requires the courage to let go of certainties,' says Erich Fromm. A Revolution is a risky undertaking, but since we're already into it, what if the farmers wanted to build their gravelly red soils into gravelly black soils, that is to say, rich in organic matter? By folk wisdom handed down from generation to generation, or by personal experience, the farmers should know that black soils are good soils, even if they don't know anything about organic matter, or about humus, or humic acid, or cation exchange capacity, or degradation by microorganisms, or about the more important soil nutrients N, P, K, Ca, Cl, Mg, Fe, Na, S, B, Cu, Mn, Mo, Zn. They can teach the farmers, of course, but in the meantime let the scientists worry by themselves about their scientific terms, major & minor & trace elements. Poor farmers need rich soils, not rich vocabularies.

When I was still in high school in the 1950s, my father already knew that blacker soils were richer soils, and I didn't know, and he didn't even finish Grade 3 in public school – too poor. Poverty is not an excuse for not knowing. Farmer knows better?

Always the wide reader since high school, I ransacked the open shelves of the main library of UPCA, the best aggie library at that time, and pulled out each book whose title caught my attention, from A to Z, from those of Ayn Rand to those of Zane Grey and Emile Zola.

Out of the box (shelf), between a variety of volumes, I found two books by Edward H Faulkner, American gentleman farmer, that struck me as Earth-shaking, if you will pardon the pun. The 1st book, *Plowman's Folly* (1943) taught me, among other things, that one could build a rich soil from a poor one by continuously incorporating crop refuse into the topsoil, along with minimizing cultivation, thereby simulating the natural cycle of death and life of organisms, something the plowman has either ignored or rejected. His farming method is a modification of green manuring, which every farmer should know anyway. The 2nd book, *Soil Development* (1952), builds on the first, of course. Both books were published by the University of Oklahoma Press. By that time, Faulkner had already proven his point.

Ultimately, Faulknerian farming calls for building a topsoil that teems with terrestrial life, swarming with bacteria and fungi and bugs and earthworms. This is a soil that is rich in OM, organic matter. In Sanskrit, 'Om' means 'one who sustains, protects.' 'The past, present and future are all included in this

one sound' (ID, webonautics.com). This makes for a perfect metaphor: The OM has it all. That is to say, with the humus and related matter, the OM soil is a soil that is not only rich in all the nutrients good for all the crops; it is also a soil that is rich in water, which is the one and only medium for transporting any nutrient from source to destination, from soil to root, from the roots to the rest of the body of the plant, including the flowers and fruits. In a few years, Faulknerian farming will transform a gravelly red soil into a gravelly black soil, from a soil starved with nutrients and lacking in water, to a soil that is rich in nutrients and full of water – and if you're the crop, that's all that matters. Basically, Faulknerian farming is not plow-less farming; rather, it is flawless farming.

## **(2) MORE RED REVOLUTION: CHANGING THE CROP**

If I were the farmer, I would be more daring. 'Bite off more than you can chew,' says Ella Williams, 'then chew it.' If farmers grow this wonderful Red Nut in 1 million hectares all at the same time, what do you call that? Monocropping. So, what if the farmers wanted to plant multiple crops and avoid the inherent risks from the monocropping of groundnut?

Actually, in Anantapur, they are now concerned about monocropping. You should worry about its detrimental impact, says YV Malla Reddy in an interview (2 December 2008, thebrokeronline.eu). Malla works with the Accion Fraternal (AF) in Anantapur. The AF is the ecology wing of RDT; the AF people are working to promote diversified cropping and to discourage monocropping. And ICRISAT is partnering with them. Good for them.

Also in India, Sudhansu R Das writes on the philosophy of monocropping, which derives from the philosophy of economies of scale (2006, thehindubusinessline.com). 'Agriculture can never be treated as an industry,' he says. 'Trying (economies) of scale in farm production will only lead to an agrarian crisis.' And agrarian crisis does not affect only the poor farmers, as we are wont to think in the Philippines. It affects us all.

Das writes that, starting in the last years of the 18th century in India, with the British rulers forcing Indian farmers to grow crops exclusively for exports, this resulted in large-scale planting of the same crop at the same time. As a result, many traditional crops and edible herbs disappeared, their growing discouraged by the more lucrative export crops. In the Philippines? Same story. Economics first, biodiversity later.

Well, you may not be worried about monocropping resulting in the loss in biodiversity – it's not something to eat, or something to show off – but you should be worried about monocropping resulting in the gain in the biodiversity of pests and diseases. Where you find hectares upon hectares of only rice, only corn, only sugarcane, only cotton, only eggplant, only tomato, only cabbage, or only strawberry, when a pest or disease strikes, it's devastating. It's true in India, it's true in the Philippines.

They call it the host-pest relationship, and this one favors the bad. Your plant host monocrops are themselves pure foods for the gods, the little gods (insects, bacteria, viruses) and some other gods (algae, fungi, arthropods). Pests! Monocrops are food aplenty wherever the pests go – their appetite is their limit. If there are no predators or parasites, those contrary little gods from other crops (such as those in a multicrop or diversified farm) to provide a natural balance of the population, the little bad gods go forth and multiply and multiply and multiply – you have either infestation or disease. I argue for natural population control.

You can't choose to ignore. Monocropping is good and bad. It is bad for the health of the soil, as it destroys the balance of soil nutrients for the crops – since the same crops draw the same set of nutrients from the same soil, something's got to give. It is good for the health of the pests. In monocropping, your choice is between the devil and the deep blue sea.

So, in India and in the Philippines, the way I see it, the Red Revolution calls for more R4D scientists from ICRISAT and partners to find out how to turn the red soils to black, to change a monocrop into a multicrop, to make farmers true revolutionaries, disturbing the status quo of red soils and monocrops. In India, perhaps groundnut can be grown alongside or in between either pearl millet, or chickpea, or pigeonpea, or sweet sorghum, or all of the above. In the Philippines, perhaps groundnut can be grown alongside or in between either rice, or corn, or beans, or cotton, or tobacco, or tomato, or eggplant, or onion, or any combination of the above. We cannot simply ignore the risks of monocropping; a widespread infestation or attack of disease is Atlas shrugging his shoulder, weary of his monotonous existence.

The Red Nut grows well on the badlands. The Red Nut can grow better on the badlands if the badlands were better, and if the Red Nut is not alone. Given the millions of hectares of red soils in India and elsewhere, given the climate of global warming, we need a climate change to that of waging the 2nd Red Revolution now. If you are a Christian, the way I see it, you will understand that the Old Testament injunction to 'Go forth and multiply' does not refer to a family but to a community of people; by way of metaphor, why should it not also refer to a community of crops? God knows that in community, there's strength.

*– Published 15 December 2008 in American Chronicle*

## **GRAMMAR OF GLOBAL WARMING. MSN ENCARTA GETS A SCIENCE EXPLAINER AWARD**



**H**aving read many a report, and retort, on global warming, it's the risqué global scientific language that bothers me, not the rising local everyday temperature. This morning I googled with Safesearch for "global warming" and got 10,500,000 English pages. I looked into 100 maybe; I looked at many more, all in very technical language – so, slowly, I warmed up to the idea that there had been a global cooling off plain words, that if I wanted plain English to heat up, if I wanted it done right, I had to do it myself.



Still, I'm not really surprised. Except a handful like Stephen Hawking, Carl Sagan, Isaac Asimov, David Suzuki, scientists have never been known to communicate well to the public. I suspect they like it like that, because then they can stay and feel safe in their ivory towers.

So, if the whole literate world is not accepting the fact of global warming, I must blame the scientists, especially the Intergovernmental Panel on Climate Change (UN IPCC), and thank Al Gore. The fact that the panel and the man are co-winners of the Nobel Peace Prize this year suggests to me that the Nobel Committee finally understood what the IPCC had been trying to tell the world since 1988, but only after the committee members watched Al Gore's *An Inconvenient Truth*, of which I had written in another level, that is, on what Team ICRISAT and her Captain William Dar have been doing propagating sweet sorghum as an intelligent climate crop.

One of the things I have been trying to point out is that with improved sweet sorghum varieties from ICRISAT, it should not be too difficult to blanket the forsaken, abandoned bare soils of the drylands of the world - and then, there should be a noticeable cooling of those places on Earth. In addition, sweet sorghum is a crop that is a true ally of poor farmers, as it is inexpensive to grow (it can grow well on bad soils), is an energy crop as well as it has other multiple uses. Encouraged by ICRISAT, entrepreneurs have seen the promise of business in this crop. There is now a distillery in India, Rusni Distilleries, making ethanol out of sweet sorghum with thousands of poor Indian farmers supplying the feedstock. In brief, these are the two reasons I say 'sweet sorghum is a rich man's choice of a poor man's crop.' The technology of the Rusni model is now being transferred in the Philippines among other countries. It only goes to show that the Indians recognize a good technology when they see one - the Filipinos likewise.

Al Gore deserved the Oscar, in case anybody doubts. Nobody explains like an explainer. So, here's my unsolicited advice to the Nobel Prize Committee: Abolish the Peace Prize and in its place create two: the Nobel Prize for Explaining, matching it with the Nobel Prize for Understanding. Plain English should be most highly regarded, not disregarded. (That goes for the Nobel Prize for Literature too.)

I suspect it's the technical language that has on one hand prevented the masses from accepting the conclusion that there is global warming and, on the other hand, preventing them from understanding what's going on in the first place. Ladies and gentlemen of science, I recommend that you learn to communicate in layman's terms. You can test any report of yours by talking to the man on the street and see if he understands what you're talking about.

Those who believe that global warming is largely man-made, are they talking sense? I know they're talking technical. Those who believe that global warming is largely man talking nonsense, are they talking any better? I know they're talking jargon too. I must be the only one trying to understand both sides now, and I find the language is getting in my way.



So, what's the problem with the global warners on global warming? Language, not the facts; communication, not data; grammar, not statistics.

For example, here's Wikipedia on Global Warming: Global warming refers to the increase in the average temperature of the Earth's near-surface air and oceans in recent decades and its projected continuation.

Wikipedia could just have said: Global warming is the world getting hotter and hotter.

Wikipedia continues: The global average air temperature near the Earth's surface rose 0.74 Celsius during the last 100 years.

Meaning: The Earth became hotter by less than 1 degree Celsius in the last 100 years.

Now, that data is not very impressive, is it? It's only less than 1°C in 100 years; why, that's hardly meaningful. In fact, it's very reassuring: The world is not getting much hotter than the global warmers would like us to believe!

Now, since I believe that man has contributed much to global warming, that which is undeniable ('unequivocal,' in the language of the IPCC), it's either there is something wrong with the Wikipedia data, or there is something wrong with Wikipedia. Is this Wikipedia's silent global warning that there is no global warming?

Here's the BBC on Global Warming: global warming is the rise in temperature of the Earth's atmosphere. It's said that by the time a baby born today is 80 years old, the world will be six and a half degrees warmer than it is now.

That's better. But it can still be improved, thus: global warming is the world getting hotter. How much hotter? By about 0.08 degrees a year. By calculation, by the time a baby born today is 80 years old...

Where did I get 0.08 degrees a year? I computed: 6.5 divided by 80. Now, that gives me an idea: Instead of Wikipedia saying, the Earth became hotter by less than 1 degree Celsius in the last 100 years, perhaps Wikipedia meant to be saying, the Earth became hotter by less than 1 degree Celsius every year in the last 100 years. The experts should watch their language – and their figures.

Jeffrey Kluger of Time (in partnership with CNN) has it right:

Global Warming Heats Up – No one can say exactly what it looks like when a planet takes ill, but it probably looks a lot like Earth. Never mind what you've heard about global warming as a slow-motion emergency that would take decades to play out. Suddenly and unexpectedly, the crisis is upon us.

National Geographic News on Global Warming Fast Facts is also great: Is It Happening? – Yes. Earth is already showing many signs of worldwide climate change.

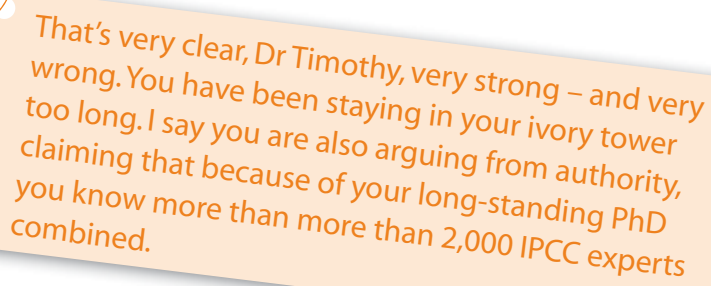
- Average temperatures have climbed 1.4 degrees Fahrenheit (0.8 degree Celsius) around the world since 1880, much of this in recent decades, according to NASA's Goddard Institute for Space Studies.
- The rate of warming is increasing. The 20th century's last two decades were the hottest in 400 years and possibly the warmest for several millennia, according to a number of climate studies. And the United Nations' IPCC reports that 11 of the past 12 years are among the dozen warmest since 1850.

And the Canadians, haven't they heard? Apparently not, they haven't been listening. The Canadian Free Press reject the thesis on global warming, Timothy Ball speaks for them:

Global Warming, as we think we know it, doesn't exist. And I am not the only one trying to make people open up their eyes and see the truth. But few listen, despite the fact that I was one of the first Canadian PhDs in Climatology and I have an extensive background in climatology, especially the reconstruction of past climates and the impact of climate change on human history and the human condition. Few listen, even though I have a PhD (Doctor of Science) from the University of London, England and was a climatology professor at the University of Winnipeg. For some reason (actually for many), the World is not listening.

That's very clear, Dr Timothy, very strong – and very wrong. You have been staying in your ivory tower too long. I say you are also arguing from authority, claiming that because of your long-standing PhD you know more than more than 2,000 IPCC experts combined (I got the number from Miriam Geronimus, [dailyprincetonian.com](http://dailyprincetonian.com)). Authority is always authority, but it isn't always right.

At any rate, Timothy Ball shows that the naysayers say it better: full of conviction, full of authority, full of unmistakable words. Now, one lesson we can learn from this is clearly this: We can all learn from the naysayers.



*That's very clear, Dr Timothy, very strong – and very wrong. You have been staying in your ivory tower too long. I say you are also arguing from authority, claiming that because of your long-standing PhD you know more than more than 2,000 IPCC experts combined.*

Surprisingly, MSN Encarta is much clearer than most on Global Warming:

Global Warming or Climate Change – measurable increases in the average temperature of Earth’s atmosphere, oceans, and landmasses. Scientists believe Earth is currently facing a period of rapid warming brought on by rising levels of heat-trapping gases, known as greenhouse gases, in the atmosphere.

Greenhouse gases retain the radiant energy (heat) provided to Earth by the Sun in a process known as the greenhouse effect. Greenhouse gases occur naturally, and without them the planet would be too cold to sustain life as we know it. Since the beginning of the Industrial Revolution in the mid-1700s, however, human activities have added more and more of these gases into the atmosphere. For example, levels of carbon dioxide, a powerful greenhouse gas, have risen by 35 percent since 1750, largely from the burning of fossil fuels such as coal, oil, and natural gas. With more greenhouse gases in the mix, the atmosphere acts like a thickening blanket and traps more heat.

Encarta gets 10 out of 10 from me. The Encarta author (along with the editor) on global warming deserves a Science Explainer Award from me. Science seldom gets clearer than this.

Finally, except for the typos, I quite admire Sierra Club’s statement on Global Warming:

Global Warming Explained – After years of debate, a near consensus among the world’s scientists has concluded that we are warming the planet, and unless we take steps now to curb global warming, our way of life, our planet, and our children are all in grave danger.

But there is hope. Each (of) us can make simple decisions that will reduce global warming (and) pollution. The Sierra Club’s network of activists and volunteers are dedicated to curbing global warming. We are working with churches, labor unions, mayors and state governments to bring about a cleaner, smarter energy future.

And I myself shall continue writing to help bring about a climate change toward clearer, smarter, plainer English reporting and retorting on climate change. For a change.

*– Published 29 October 2008 in American Chronicle*





## THE GREEN ELEPHANT OF INDIA. UNDERSTANDING THE PARABLES OF BUDDHA, JESUS, SCIENCE



**T**oday, we study figures of speech, but especially metaphors. Why? George Lakoff & Mark Johnson, linguist & philosopher, in their book *Metaphors We Live By* published in 1980 ([theliterarylink.com](http://theliterarylink.com)) tell us: 'We live by metaphors.' Sure. Even if we don't understand them.

Examples from the book (my examples in parentheses): 'He attacked every weak point in my argument.' (I ducked every time.) 'You need to budget your time.' (I don't have the time.) 'His income fell last year.' (He dropped out of sight.) 'He is high-minded.' (You are low-brow.) 'Lazarus rose from the dead.' (Jesus had listened to the heart of Mary Magdalene.) 'When you have a good idea, try to capture it immediately in words.' (Seize the moment!)

A parable, I realized just now, is a metaphor. In the Bible, in the New Testament, the parables of Jesus are like that, metaphors:

*The kingdom of heaven is a sower who went out to sow his seed ...*

*If a grain of wheat dies, it bears much fruit ...*

*He who loves his life will lose it ...*

*The kingdom of heaven is a net thrown into the sea and gathered fish of every kind ...*

*The kingdom of heaven is a grain of mustard seed a man took and sowed in his field ...*

*Look at the birds of the air: they neither sow nor reap nor gather into barns, and yet your heavenly Father feeds them ...*

'And why do you speak to them in metaphors?' the disciples asked. 'Because that's what they understand,' Jesus said. The disciples didn't know the power of the metaphor. But, you protest, the parables of Jesus were really not all metaphors. No, of course not; I know a simile when I see one; but if you remove the word 'like' or 'as' from each simile story, you have your metaphor story. I did just that in 3 of my examples above.

The metaphors I'm thinking of right now are those concerning the elephant of India. I'm not talking Greek here, am I? I know I'm not talking out of my hat. You must know the elephant. You know, it's a wall, if all you can see is the body. It's a spear, if all you can see is the tusk. It's a snake, if all you can see is the trunk. It's a tree, if all you can see is the knee. It's a fan, if all you can see is the ear. It's a rope, if all you can see is the tail.

Aspiration, effort, intention, analysis – why, those words remind me of science. Aspiration reminds me of the objective of my research, effort of the work that has to be done, intention of the meaning or rationale of what I'm doing, analysis of the interpretation I still have to make out of the results.



Usually, the elephant is what you see at first sight, your metaphor. So, it seems to me that a metaphor is a limited tool for communicating what we mean. But it's handy. As long as we know its limitations, it's a good device to use to suggest what we mean when we can't say what we mean. Which is most of the time. We must come, say George Lakoff & Mark Johnson, 'to a new recognition of how profoundly metaphors not only shape our view of life in the present but set up the expectations that determine what life will be for us in the future.'

Now, let's see how the metaphor of the elephant can shape our view of science. I say: We can't understand science if we can't understand the elephant. This animal is a symbol of wisdom, luck, loyalty. So, let's study the elephant. You think you know the white elephant? This was chosen by the Buddha as one of his many incarnations.

There was a white elephant superimposed on the red field of the national flag of Siam, the old name of Thailand. To the Thais, the elephant is a symbol of fortune, of intelligence, as it has 'a fine memory,' hence the expression 'an elephant never forgets' (chiangmai-chiangrai.com).

'Perhaps no other animal is as glorified in the East as the Elephant' (statue.com):

As the largest creature to walk the Earth, the elephant is seen as a symbol of strength and power. It is an extremely hard working animal that is revered in countries like Thailand that have made it one of their national symbols. Unlike many members of the animal kingdom, the elephant is blessed with super intelligence and a very long life span. Because of this, it has become a symbol for wisdom and dignity.

Today buddhism.kalachakranet.org told me that:

The Precious Elephant is a symbol of the strength of the mind in Buddhism. Exhibiting noble gentleness, the precious elephant serves as a symbol of the calm majesty possessed by one who is on the (Buddhist) Path. Specifically, it embodies the boundless powers of the Buddha which are miraculous aspiration, effort, intention, and analysis.

Aspiration, effort, intention, analysis – why, those words remind me of science. Aspiration reminds me of the objective of my research, effort of the work that has to be done, intention of the meaning or rationale of what I'm doing, analysis of the interpretation I still have to make out of the results.

My study is of course the elephant. So now let me tell you my version of the story as told in the parable by the Buddha ('The Parable of the Blind Men and the Elephant,' kheper.net); I call my story The Parable Of the Blind Indians Nine. They wanted to know what an elephant was, so the servant of the Raja brought them to the elephant, each to a separate part of the animal. Their excited reports?

*'It's a mound of clay!' He had been holding the head; he was the potter.*

*'It's a winnowing basket!' She had been holding the ear; she was the farmer's wife.*

*'It's a plowshare!' He had been holding the tusk; he was the farmer.*

*'It's a plow!' He had been holding the trunk; he was the farmer's neighbor.*

*'It's a granary!' He had been holding the body; he was the merchant.*

*'It's a pillar!' He had been holding the foot; he was the architect.*

*'It's a mortar!' He had been holding the back; he was the builder.*

*'It's a pestle!' He had been holding the tail; he was the worker.*

*'It's a brush!' He had been holding the tuft of the tail; he was the painter.*

You are entitled to your own metaphor. But do not be blind to the fact that you must know that a metaphor represents only a part of the reality of the whole elephant.

And why today did I come to study the elephants when I'm in the Philippines and the nearest elephant to where I sit in front of this PC is thousands of miles away in India and Thailand? I wasn't thinking of elephants at all when I began to read 'ICRISAT's New Vision and Strategy To 2010' (icrisat.org) – I have been trying to understand the theory and practice of science of ICRISAT so that I can find out for myself if it's creating any impact on the world at all as it should be. I thought of the many different things I had to understand of ICRISAT, and then I remembered the parable of the elephant. I needed to see the elephant, the Big Picture.

Another problem of the popularizer of science like me is the science itself, the language that comes out of the mouth of dudes, the torrent of words that spew out of the mouth of experimenters, the slew of terms that scientists use to describe their work, or to explain their behavior.

So, what do you make of these? (icrisat.org):

**Vision** – The improved well-being of the poor of the semi-arid tropics.

**Mission** – Reduce poverty, enhance food and nutritional security and protect the environment of the semi-arid tropics by helping empower the poor through science with a human face.

**Mandate** – To improve people's livelihoods in crop-livestock-tree production systems in the semi-arid tropics through integrated genetic and natural resource management.

I have to make a whole elephant out of the body parts: so, here's my first try:

Vision + Determination + Mission + Mandate + Program + Project + Activity = Elephant.

That is the elephant of ICRISAT, which is one of 15 centers of excellence of the CGIAR. The CGIAR describes itself as 'a strategic alliance of members, partners and international agricultural centers that mobilizes science to benefit the poor'. ICRISAT's target is hundreds of millions of people in the drylands of Africa, Asia, Latin America, not to mention part of Australia. Since ICRISAT is pursuing a 'Grey to Green Revolution' as Team ICRISAT puts it; and since this elephant is working for hundreds of millions of people, it must be a mammoth mammoth. I shall call it then The Green Giant Elephant of ICRISAT; since



ICRISAT is based in India, this is The Green Giant Elephant of India. Elephant. That means you cannot separate one part from the other parts. Yes, the whole is greater than the sum of its parts, according to the precepts of holism. No, you can't appreciate that if you're using reason, if you're being logical, if you insist on critical thinking. Think about that.

For we are members of one body, writes St Paul, having one head, enjoying the effusion of the same grace, living by the same bread, walking in the same way, and dwelling in the same home. In short, in all that makes up our being – in the whole faith and hope by which we stand in the present life, or labor for that which is to come – we are both in the spirit and in the body of Christ so united, that if we fell from this union we would cease to be. (newadvent.org)

For the people, the elephant is a workhorse, if you will pardon the expression. For ICRISAT, the biblical injunction to be one elephant means the Activity must relate to the Project, that which must relate to the Program, that which must relate to the Mandate, that which must relate to the Mission, that which must relate to the Determination, that which must relate to the Vision, that which must relate to the People. The people are the ultimate judge of your elephant, if it be green.

Now then, I believe that when scientists finally learn to speak in parables, that is, in metaphors – since they're more educational than similes – then, we can appreciate science theory more, if not understand science practice better. And if the scientists don't learn to speak? Then we'll have to speak for them! Don't forget: Science is for the people, not scientists.

*'Why do you teach them science in parables?'*

*'Because that's what they like.'*

*'I like it when everything comes together,' says Col John 'Hannibal' Smith (George Peppard), Captain of the A-Team (a popular TV series in the early 1980s). As in The Parable of the Green Giant Elephant.*

*– Published 4 November 2008 in American Chronicle*



## **ELEMENTARY, PASTOR WATSON. GEORGIA PRAYS FOR RAIN, I PRAY FOR REASON**



**A**tlanta, Georgia: `Gov Sonny Perdue stepped up to a podium outside the State Capitol on Tuesday and led a solemn crowd of several hundred people in a prayer for rain on his drought-stricken State' (Greg Bluestein, 13 November, news.aol.com). The Governor was joined by other State elected officials (James Salzer & Jim Galloway, 13 November, ajc.com). Here is man in trouble, forgetting that he himself has declared the separation of his Church from his State.

I'm not surprised many a politician says one thing and does another. In May, Prime Minister John Howard asked churchgoers to pray for rain to end the drought that has devastated crops and farmers in Australia (Greg Bluestein, 13 November, [ap.google.com](http://ap.google.com)). In the US, we are reminded that George Washington declared 'a day of prayer and thanksgiving' and Harry Truman instituted a 'National Day of Prayer.' Does that mean that the more astute politicians acknowledge that there is a power higher than any or all politicians combined?

This is a reminder that Human Rights is good, but not as good as Divine Rain when faucets in kitchens are running dry because the reservoir in the lake is running low on water as the streams that feed it are coming in trickles. These are the times when we become aware of the value of water – because now this liquid is very precious to us, as we imagine the tap running dry in 90 days counting from 10 October (data from GBC, 13 November, [prayer.gabaptist.org](http://prayer.gabaptist.org)). Lake Lanier can hit its lowest point ever, 21 feet below normal, later this month (TAU, 'Georgia Praying For Rain,' [wjb.com](http://wjb.com)). Lanier can dry up altogether in less than 90 days (Ben Whitford, 'Water Wars,' 2 November, [plentymag.com](http://plentymag.com)), and that will kill the crops and finish the fish stocks in Alabama and Florida. The crops and the fish are precious; the water is priceless.

In response to the drought and the danger, the Georgia Baptist Convention (GBC) came up with a downloadable Prayer Guide in pdf format for rain. I wish rain can be downloaded as easily as the GBC pdf. And what does that mean, Prayer Guide: They aren't taking chances with people praying guided only by their hearts?

On 4 September, the Director of the Georgia Environmental Protection Division (EPD) declared a Level 4 drought across the Northern third of Georgia (GBC, cited). Concerned, the GBC selected 4 November as the Day of Prayer. I can imagine plenty of prayers that went up to Heaven; I can also imagine hardly a drop of rain coming down from up there.

According to the GBC, CNN reported on 17 October that 'the shortage of water in Georgia has created concerns among the citizens of Georgia, Alabama and Florida about how best to manage the regional water supply.' Sorry, ladies & gentlemen, but that's the wrong premise – 'how best to manage' – because, obviously, you have been remiss in managing the supply in the first place. Because the water is going, going ... almost gone, now you're worried, when you should have minded Lake Lanier decades ago. You cannot manage backward in time.

The management of Lake Lanier is only 10% about rationing or even rationalizing the water supplied to Alabama, Florida, Georgia; it is 90% about managing the sources of headwaters of the streams that drain into the lake. In short, it's all about good watershed management while there's still water. In the absence of that, what can the Alabamans, Floridans and Georgians do? And that goes for the rest of us humans. I say: Pray for rain – in a roundabout way. By doing any or all of these:



- Save on paper. Why? Reason tells us when enough of us save paper, we save a tree; when enough trees have been saved, we save a forest; when we save a forest, we have more rains.
- Plant degraded and denuded areas. From more vegetation, more water is transpired and becomes more clouds, and more clouds become rain. Those of you who are in the drylands of Africa, Asia, Australia and Latin America, I would recommend planting abandoned or rejected bare areas in small and big scale the crop called sweet sorghum, that which I call 'The Great Climate Crop' because it grows well where most crops grow badly if at all. You can learn more about sweet sorghum as an intelligent source of ethanol from Team ICRISAT captained by William Dar.
- Save water at home or office or outdoors or at the farm. When you conserve water, the same supply lasts a little longer; since the water comes from the rain, you are essentially conserving rain. Reason tells me it is much more practical conserving rain than praying for rain.

'I believe in miracles,' declared Pastor Maurice Watson of Beulahland Bible Church. 'How about you?' Elementary, Pastor Watson, elementary. I believe in miracles. Rain is the miracle of water evaporating from the surface of Earth, becoming cloud, then falling as teardrops of Heaven. Now, what have you done with the rain? If you have not been taking care of the watershed that feeds Lake Lanier, you have driven away the rain. If you have denuded the watershed, you have denied yourself rain. The water in Lake Lanier was rain before this time. If you have wasted the water, you have wasted the rain that came for you.

Rain comes from the surface of a lake, river, stream and from plants transpiring; in 16 days, the water in the air is replenished (data from 'Hydrologic Cycle,' nwrfc.noaa.gov). If you cut down the trees in the forest, you cut down the amount of water transpired; you cut down on the amount of water that becomes rain.

If you do not conserve water in your home, you are wasting rain because that water came from the rain. So you find that you have to pray for rain. Well, a prayer like that is the last resort. Have we done all we could before praying for rain?

When you conserve water, the same supply lasts a little longer; since the water comes from the rain, you are essentially conserving rain. Reason tells me it is much more practical conserving rain than praying for rain.

There is also the matter of the nature of the prayer for rain itself. We have to give God a chance to be faithful to His laws. We believe that those who seek, find; those who ask, receive – but is it reasonable to plead with God for rain when in the first place we have made it difficult for the rains to come?

Governor Sonny Perdue confessed after the praying at the Capitol that the Georgians had not done all they could in matters of conservation (James Salzer & Jim Galloway, 13 November, [ajc.com](http://ajc.com)). As a matter of fact, local officials had ‘done little to promote or plan for water conservation’ (Whitford, cited):

A million homes in the Atlanta area still have outdated plumbing rather than the low-flow fixtures required of new constructions; worse still, more than half of new suburban developments are still being built with wasteful septic tanks instead of sewers that would allow reprocessing of waste water. Meanwhile, years of under-investment have taken their toll: every day, almost a fifth of Atlanta’s water leaks away without being used. I’m looking forward to the day Georgian State officials and Protestant ministers will find that they have to do more than just pray at the steps of the Capitol. I pray that they will find reason.

For all that, they can start with the Adarsha Watershed experience of ICRISAT.

*– Published 16 November 2007 in American Chronicle*

## ATLAS BLOGGED! CLIMATE CHANGE IN UK, THEN IN UP, THEN IN US?



**A**lmost simultaneously last week, the Parliament of the UK and the Intergovernmental Panel on Climate Change of the UN published their official statements on global warming. 15 November UK, a bill to be debated by Members of the Parliament. 17 November IPCC, a synthesis report to be acted upon by every Government in the world. Except the US?

Atlas Shrugged by Ayn Rand is 'about the importance of reason and productivity, and how those characteristics have such a bad press, relative to hope and inadequacy' (undated, Harold Leiendecker, eckerd.edu). Just like in the Philippines, if the press would have little to do with global warming, which has everything to do with reason and continuing productivity, it's just like the US.

Scientists telling politicians what must be done – in the case of global warming, I'm glad there's no separation between Science and State. Kyoto Protocol was the boy who cried 'Wolf!' on the blustery day of 11 December 1997; the US was the villagers who told the shepherd boy in a delayed telecast 4 years later, 'Save your frightened song for when there is really something wrong!' (borrowing from storyarts.org). What does that mean: The US can tell a lie when it sees none?

Ah, but listen to President George W Bush talk about the United States' commitment to a leadership role in climate change (vienna.usembassy.gov):

The Earth's well-being is also an issue important to America – and it's an issue that should be important to every nation and in every part of the world. My administration is committed to a leadership role on the issue of climate change. We recognize our responsibility and we will meet it, at home, in our hemisphere, and in the world.'

Is that a fact? Yes, the US is the leading polluting country in the whole world (Vexen Crabtree, June 2002, vexen.co.uk). No, on 29 March 2001, the Bush administration withdrew the United States from the Kyoto Protocol (vienna.usembassy.gov). The Greatest Government on Earth cannot be told, not even reminded, what it must do. Pride before the fall?

Learning more from Ayn Rand's Atlas Shrugged, as according to Leiendecker (cited):

The overarching story is that the men of the mind, who like Atlas, carry the world on their shoulders, gradually get fed up with being exploited, and abused, and given no respect. They retire from the world, shrugging the burden, in effect.

In the United States, the overarching story is that the man of the command, who thinks he is Atlas carrying the world on his shoulder, shrugs the burden. Those whom the gods wish to destroy, first they make shrug?

About leadership in climate change, there was the 1992 United Nations Framework Convention on Climate Change (ec.europa.eu). With the very first climate change bill in history, today the UK is the world's #1 boy shepherd, tending to a pack of sheep grazing, knowing of a coming wolf that could devour not only the sheep but also the shepherd. Could it be that George W Bush doesn't know the story of 'The Boy Who Cried Wolf?' With the 4th assessment report of the UN IPCC, this is the 4th time the boy has cried 'Wolf!' If you don't care about the sheep, does that make you the wolf?

'We recognize our responsibility and we will meet it, at home, in our hemisphere, and in the world.' What George W Bush seems to be saying is that the US is

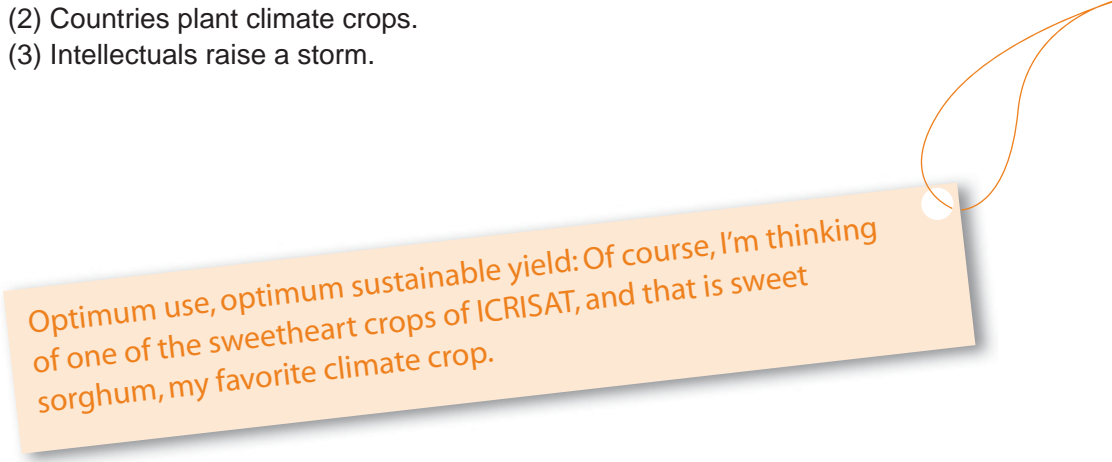


at liberty to choose what course to take, as if rejecting the Kyoto Protocol as an imposition devoutly to be unwished, as if it is something abridging freedom of choice which, thereby, the US is claiming as the 1st freedom of a country. Sixty six years earlier, US President Franklin Delano Roosevelt spoke to the 77th US Congress (6 January 1941) about 4 freedoms: freedom of speech, freedom of worship, freedom from want, freedom from fear. The Yankees are very good when it comes to declaring freedoms. Learning from the Yankees, I suggest the United Nations declare a 2nd freedom of a country, that is, freedom from pollution. In that way, the stubborn United States and other big polluting countries can exercise their freedom of choice and the stubborn countries of the rest of the world can combine forces and exert their freedom from pollution. Something's got to give. I hope it will be the stubborn United States. If the US goes, can Australia be far behind?

The US is ignoring world history to our peril. My first Atlas of global warming is the French mathematician Jean Baptist Joseph Fourier who discovered in 1824 that the Earth's temperature was in fact slowly increasing (globalwarmingarchive.com). My next Atlas is Nobel Laureate Svante Arrhenius who in the late 1900s coined the term 'greenhouse effect' to explain how CO<sub>2</sub> traps heat in the Earth's atmosphere. My third Atlas is amateur scientist GS Callendar who in the 1950s claimed that the greenhouse effect was impacting the atmosphere of the Earth (globalwarmingarchive.com). The 'Callendar effect' led to increased research on global warming, and studies began to predict that increased use of fossil fuels would trigger an outbreak of global warming. My biggest Atlas would of course be, who else? Al Gore.

First the UK. Now then, what can the rest of the world do? Three things:

- (1) Countries pass their own climate change laws.
- (2) Countries plant climate crops.
- (3) Intellectuals raise a storm.



Optimum use, optimum sustainable yield: Of course, I'm thinking of one of the sweetheart crops of ICRISAT, and that is sweet sorghum, my favorite climate crop.

## **(1) COUNTRIES PASS THEIR OWN CLIMATE CHANGE LAWS.**

And twice better than the UK Bill on Climate Change. (a) To reduce carbon dioxide emissions by at least 80% (the UK sets it at only 60%) by 2050, against 1990 levels. Countries can further learn from the UK example. According to Green Party principal speaker Caroline Lucas ([politics.co.uk](http://politics.co.uk)), 'We need a climate change bill which sets binding emissions-reduction targets of at least 6% a year' to achieve cuts of 90% by 2030. (b) To put in place a year-on-year commitment, that is, measurable milestones on CO<sub>2</sub> reductions. The UK bill does not do this. Without milestones, nobody can tell whether anything is moving forward. Unless of course you're a politician and you're really just making empty promises.

## **(2) PLANT CLIMATE CROPS.**

If you haven't heard about climate crops, now you have. If I may define climate crop, it is a plant cultivated from which to extract biofuel ultimately to replace fossil fuels used in cars and trucks. A short list of climate crops is this: corn, *Jatropha*, sugarcane, and sweet sorghum.

The idea of using marginal lands for growing crops is not a new idea; in 1972, ICRISAT was founded on that very idea. The millions of people in the drylands of the tropics are poor and so are their soils. It is optimum use that is important and, already in 1992, ICRISAT was talking that language, specifically on the 'optimum use of supplemental water' ([icrisat.org](http://icrisat.org)).

Optimum use. I am reminded of a related term I first learned in 1981 – OSY (optimum sustainable yield). While OSY was designed for fisheries, I have always believed that it was applicable in the fields of agriculture, forestry, industry, or wherever there are resources used for production or service. OSY is best, most favorable, ideal; neither minimum nor maximum. By definition, it is sustainable. I never believed in the economic genius of maximum yield, maximum profit, maximum benefits, maximum this, maximum that. You'll never find sustainable if you're always looking for maximum. Anything that is maximum is too much. 'To the max!' is crazy.

Optimum use, optimum sustainable yield: Of course, I'm thinking of one of the sweetheart crops of ICRISAT, and that is sweet sorghum, my favorite climate crop. That is because this crop makes optimum use of soils that are barren, that lack water, that are denuded, that are waterlogged, that are otherwise inhospitable to other crops. A great survivor crop.

So when I think of marginal lands and biofuel crops, I think of only one sweet crop: sweet sorghum. During the 35th anniversary celebration of Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) at the Intercontinental Manila on 9 November, I heard ICRISAT Director General William Dar say that in Ilocos Norte, when the sweet sorghum field was flooded, the plants bowed to the ground, as flooded crops

would; when the water subsided, lo and behold! The plants rose up again, as flooded crops would not. If man were only as intelligent as this crop, he would be an Atlas, that whose will adversity cannot break.

### **(3) INTELLECTUALS RAISE A STORM.**

Today, when I think of intellectuals, I do not think of an individualistic Atlas; I think of a million Atlases, more practically, a million bloggers who have by nature transcended the power of the media to declare or deny their talents and who gleefully exercise their freedom of expression, who are very creative, who love their neighbors. Who are those neighbors? The geniuses know that. The geniuses must possess the mental acuity to penetrate the armors of indifference, or ignorance, or even intellectual dishonesty in the world. Each of those genius bloggers to me is an Atlas who cares about reason and productivity, who cares about global warming. So I say to each of those geniuses:

#### **ATLAS, BLOG!**

I know that you carry the world on your shoulder, and you should. What are intellectuals for? Whether you like it or not, already you do carry a part of the world.

The intellectuals of the world should raise a storm of Intensity 5, where the waves of persuasion rise 17 feet high and move beyond the shore of indifference 13 miles inland. I learn that UK Prime Minister Gordon Brown is calling upon developed countries to 'show leadership' (10 Downing Street, number-10.gov.uk), saying the IPCC findings released earlier are 'a wake-up call for the world,' the same which UN Secretary General Ban Ki Moon refers to as the 'defining challenge of our age.' If the countries should not wake up to the challenge, Atlas should shrug his shoulders, but please not the burden.

The WWF photo shows the WWF's giant boat model for a London campaign on the UK bill, as 'the WWF doesn't believe the Climate Change Bill is water-tight' (Gemma Taylor, newconsumer.com). WWF, you're an Atlas to me.

The newest Atlas to me is Andy Ross, who is the Director of New Caledonian Woodlands, a new not-for-profit Edinburgh initiative launched mid-November to reduce everyone's individual carbon footprint by native-tree planting (to directly enrich habitats for plants and animals) by groups (to directly enrich lives by being parts of a team or community) (news.scotsman.com). You can beat them by joining them.

In UK, we're OK; in US, we're not okay. In the Philippines, if the intellectuals of UP (University of the Philippines) don't raise howls of protest against polluters as they are wont to do about anything they think polluting in current domestic affairs, if they think that by their scholarly silence they have gotten away from their responsibility to the people in the matter of global warming, let this be

a global warning that they need an intellectual climate change themselves. I don't see an Al Gore, an Atlas, among them. If UP is washing her hands off just like the US, I'll exercise my academic freedom and mix my metaphors: (1) Both US and UP are doing their own conscious Pontius Pilate. (2) Birds of a feather shirk together.

I see we must not wait for the rest of mankind to warm up to global warming on their own. I say those who lay claim to being intellectuals have a duty to the world to shrug their shoulders in the manner of Ayn Rand's Atlas. For the moment, I am content that Atlas blogged first in my country, the Philippines.

*– Published 18 November 2007 in American Chronicle*

**YOU HAVE TO BELIEVE.  
ON THE POOR IN SCIENCE,  
THE POOR IN FAITH**



**N**ovember is a good month, I say. Only if it's all right with you. (I say also, any month is good – it's not in the month; rather, it's in the attitude.) I understand from Golden Princess (tripod.com) that November has 3 virtues: wisdom, courage and serenity. If you have those, you would be the richest even if you were the poorest. Those words remind me of this prayer that I memorized probably in high school 50 years ago and will always associate with St Francis:

*Lord, grant me  
the serenity to accept the things I cannot change,  
the courage to change the things I can, and  
the wisdom to know the difference.*

St Francis lived in the 13th century. Now, this Saint had a great love for the poor so much so that he gave up his inheritance of great wealth to spend on the poor and became a Servant of the Lord, Roman Catholic, embracing a life of poverty ([franciscanfriars.com](http://franciscanfriars.com)). Faith does that to the best. And the worst? They will have to take care of themselves too.

We live in the 21st century. Now, ICRISAT has dedicated itself to the drylands of Africa, Asia, Australia and Latin America, in those disadvantaged places where live ‘the poorest of the poor, helpless and struggling against the insidious bonds of hunger, poverty and environmental degradation,’ says William Dar, Director General of ICRISAT, speaking in honor of 196 ‘Loyalty Day’ awardees on 21 November, opening the Institute’s 35th anniversary celebrations at its campus in Patancheru, Andhra Pradesh, India. At the 35th anniversary of the PCARRD at the Intercontinental Manila, I heard Dar refer to himself as ‘Servant Leader.’ Science does that to the best. And the worst? They will have to take charge of themselves too.

Dar had a special message to the loyalists of Team ICRISAT:

*The celebrations that begin today confirm ICRISAT’s status as the center of scientific excellence. We are here today to honor all those who made this possible – those who have been here as long as the Institute itself, those who rose with it and learned to believe in its goals, those who turned adversities into opportunities, and those who endured tough times yet believed that every cloud has a silver lining.*

You have to believe.

Science becomes you if you do it in the name of the least of His brethren. If you do your science always mindful of the three virtues of November any month of the year: serenity, courage, wisdom. And the poor? They are rich with adversities but don’t know how to turn them into opportunities. As long as they don’t have the serenity, courage and wisdom – in science or in faith – the poor we will always have with us. And if we don’t have those virtues ourselves? We will always be the poorer.

ICRISAT is an award-winning, wide-ranging, demand-driven (not supply-pushed) international science institution under the CGIAR. This CGIAR center of excellence owes its success, according to Dar, on ‘five major catalysts that have kindled our science triumphs and impacts’:

- (1) Clear vision, mission, goal, strategy
- (2) Team spirit
- (3) Strategic partnerships



- (4) Sound financial situation
- (5) Decentralized governance.

Personally, with what I know of ICRISAT, if I were to choose only one factor to explain the Institute's astounding success, it's team spirit. This is clearly the essence of the name they have for themselves: Team ICRISAT.

*Who focus their eyes on the vision? The team.*

*Who tune their ears to the mission? The team.*

*Who safeguard their hearts' passion on the goal? The team.*

*Who keep their head on the strategy? The team.*

*Who forge and carry out the partnerships? The team.*

*Who make sure the financials are sound? The team.*

*Who make decentralized governance work? The team.*

*Whom can you rely on to be trustworthy and loyal? The team.*

*Who makes the team? The leader.*

This year, ICRISAT was rated O (Outstanding) by the World Bank. You would think they would rest on their laurels, but they won't. Their Captain recognizes that there are major challenges yet to meet, even as 'today, ICRISAT is riding high on the wave of success' and celebrating:

*We have major challenges ahead, such as climate change, desertification, land degradation and drought, and I visualize a growing Team ICRISAT getting set to face them with its excellent scientific expertise. Let us fortify ICRISAT, make it strong for the poor. 'We have an institution to grow, a mission to fulfill, and impacts to achieve.' Together, let us forge ahead in this task of growing ICRISAT for the poor!!*

Among the best, the challenges they always have in mind.

'To look at past achievements and future challenges' – that exactly is the idea sold by a successful Portuguese explorer to King Charles I of Spain, married to Regina Isabelle, or Queen Isabela. Convinced, King Charles was the one who financed the expedition of Ferdinand Magellan in 1519-1522 (vlib.iue.it).

*As long as they don't have the serenity, courage and wisdom – in science or in faith – the poor we will always have with us. And if we don't have those virtues ourselves? We will always be the poorer.*

Magellan had a pioneering heart. While he was killed in Mactan, having been embroiled in a tribal war, his voyage achieved 3 things:

One, he discovered the Philippines for Europe.

Two, this voyage was the first successful circumnavigation of the world.

Three, 'the voyage proved that the Earth is round.'

Nothing attempted, nothing arrived at.

Courage, serenity, wisdom. 'We have an institution to grow, a mission to fulfill, and impacts to achieve.' Nothing tried to, nothing triumphed over. The ICRISAT voyage should prove that the poor we should not always have with us.

*– Published 22 November 2007 in American Chronicle*

**FAMILY AFFAIRS.  
HAVING DONE WELL,  
ICRISAT MUST DO BETTER!**



**P**oor Team ICRISAT! The International Crops Research Institute for the Semi-Arid Tropics is exulting, celebrating its 35th anniversary, 21-24 November 2007, with the knowledge that it has been rated O (Outstanding) by the World Bank. Excellent, I say. Now I shall expect more. I? I am the poor; while my needs are few, my number is legion. Let science go figure that one. This is typical science considering the needs of the poor: The FAO Newsroom mentions insufficiencies in the following: food, micronutrients in the diet. To meet those, there must be, in FAO's opinion, a war on hunger, and biotechnology should be able to contribute to it.

David Dickson, Director of SciDev.Net, lists down the poor's needs as (a) a greater share of the benefits of development, (b) energy supply, (c) cure or treatment of diseases, (d) options in response to climate change.

Is anyone actually meeting the needs of the poor? There is one practical measure of that, the 'Crucible Test,' that which Mahatma Gandhi bequeathed the Indians, according to Devaki Jain (Monte Leach, March 1998, [share-international.org](http://share-international.org)):

I will give you a talisman. Whenever you are in doubt or when the self becomes too much with you, apply the following test: Recall the face of the poorest and weakest man you have seen and ask yourself if the step you contemplate is going to be of any use to him. Will he gain anything by it? Will it restore him to a control over his own life and destiny?

I'll consider that. 'We have to make the choice that the needs of the poor come first. Then we can transform the economy,' Devaki Jain says. I'll consider that too.

But right now, we're not finished trying to find out what are the needs of the poor.

According to Janet A Simons, Donald B Irwin & Beverly A Drinnien (1987, *Psychology – The Search For Understanding*, New York: West Publishing Company), humanistic psychologist Abraham Maslow theorizes 5 levels of basic needs of man ([honolulu.hawaii.edu](http://honolulu.hawaii.edu)): Level 1, Physiological – oxygen, food, water, relatively constant body temperature; Level 2, Safety needs; Level 3, Needs for love, affection and belongingness; Level 4, Needs for self-esteem; Level 5, Needs for self-actualization: to be and do that which the person was 'born to do' (destiny, fate, or calling).

Considering all that, the lesson for me this time is that the basic needs of the poor are not different from those of the rich. I neither heard nor read that one before and it's crucial to this essay I'm trying to write, so I'd like to emphasize it by restating it: The basic needs of the poor are the same as those of the rich.

It's time to review human needs. In Abraham Maslow's Hierarchy of Needs (Wikipedia), education is not a need, lack of anything is not a need. Now, therefore, lack of education, lack of information, lack of access to credit and other expert-stated needs such as lack of cost-effective technologies are not needs – they are what they are, lacks. Their satisfaction is means to ends, which are to satisfy the needs. That is to say, for instance, education does not satisfy a need; in comparison, having food satisfies a need, and food can be obtained by:

- Buying food from income derived from one's job based on one's education
- Growing the food, as a farmer does
- Barter, such as labor for food, as a worker does

- Begging or being given, as a mendicant does
- Causing the food to be produced, as by an entrepreneur.

Now, considering my list, I note that the prevailing paradigm in the civilized world is that lack of education is such a terrible need that public policy or private initiative must do something about it ASAP. And yet, millions of people in the world prove that one does not need education to ‘succeed in life’ (in common parlance), to meet the basic needs and beyond (in Maslow’s terms).

Education is for obtaining a job; entrepreneurship is for creating many jobs. Perhaps the richest man on Earth is the best example of what I have just said: Microsoft’s Bill Gates, who has been called by Harvard’s Crimson as ‘Harvard’s most successful dropout’. He is not only Harvard’s but the world’s most successful entrepreneur.

Another school dropout and very highly successful entrepreneur is another nerd, Apple’s Steve Jobs, who is now Disney’s biggest stockholder with US\$ 7B, which is what Disney paid for Jobs’ highly successful Pixar animation company.

Which leads me to thinking now: Some poor farmers can be taught to be entrepreneurs, so that they can produce their own income and meet their own needs; the other farmers can be taught to become part of an entrepreneurial arrangement such as that of a cooperative or a corporate farm.

Just like ICRISAT, I’m thinking of the poor millions in the drylands of Africa, Asia, Australia, Latin America – and I’m thinking of experts thinking of how to educate the poor with new science-based knowledge and new technologies.

ICRISAT Director General William Dar delivered his annual day speech titled ‘Growing Stronger For Global Challenges’ earlier today, 22 November. In it, I note particularly Dar’s report of ICRISAT’s several initiatives: (a) improved crop varieties, now grown in millions of hectares in Asia and Sub-Saharan Africa, (b) a downy mildew-resistant pearl millet hybrid, (b) a new groundnut variety, (c) an aflatoxin food-testing kit, (d) seed aid policies, (e) helping create large new markets for agriculture, (f) crop diversification with high-value crops, and (g) community watershed management – helping farmers devise ways to manage landscapes, soils and crops to store up more and use water and nutrient resources more efficiently.

Now, then this is my challenge: Cultivate the spirit of family enterprise. That is my challenge to ICRISAT – and the rest of the 15 centers of excellence of the CGIAR.

That is all quite commendable; in fact, it's exceptional.

But I'm still thinking like this: The African poor, the Asian poor, the Indian poor, the Australian poor, the Philippine poor, the Latin American poor – What must they have in common? My insight this time: Entrepreneurship.

The poor as entrepreneurs: Why not? Bill Gates started only with an idea, and he was a school dropout. (Different were Steve Jobs who sold his beloved Volkswagen and Steve Wozniak who sold his beloved scientific calculator to start Apple Company.) The one who started only with a good idea (software) and a bad school record (Harvard dropout) is the richest man alive today.

You can be poor and an entrepreneur. That is to say: Entrepreneurship is a good idea whose time has come for the poor. And let it be family entrepreneurship, where all adult family members are involved and responsible.

Why not? Entrepreneurship is a direct response to concerns on:

- Lack of access to resources – Consider this only in terms of entrepreneurship.
- Lack of market – Consider this only in terms of entrepreneurship.
- Empowerment – What's more empowering than entrepreneurship?
- Gender equality – Not a realistic or a realizable dream.
- Gender equity – Equity for all, not simply the female of the species.
- Land tenure – You don't need to own land to make it productive.
- Unemployment – You will employ at least one other person in the family.

We have too many formal schools to manufacture employees (they have become expensive too) – and too few to create entrepreneurs. And then again, we don't need formal schools to study or learn entrepreneurship. Meanwhile, the USAID is advocating microenterprise development programming for the poor in the 21st century ([microlinks.org](http://microlinks.org)). Which means the USAID is finally on the right track where before it was just one of the boys.

Now, then this is my challenge:

Cultivate the spirit of family enterprise.

That is my challenge to ICRISAT and the rest of the 15 centers of excellence of the CGIAR.

Cultivating the spirit of family enterprise everywhere would be cultivating citizen responsibility as a common response to the challenge of catastrophic climate change. That would be the nicest change of all.

*– Published 23 November 2007 in American Chronicle*



## WAITING FOR GODOT? CLIMATE CHANGES WHILE THE YANKEES DAWDLE



**S**amuel Beckett won the 1969 Nobel Prize for Literature and changed the universe of the literate with his book *Waiting for Godot*, that which is centered around two men, Estragon and Vladimir, who keep a vigil for Godot, who never gets there, the road to nowhere. By refusing to abide by the Kyoto Protocol, refusing to acknowledge climate change, is the US waiting for Godot? Alternative questions: Is the US waiting for Al Gore?

Jak Peake writes ([hewett.norfolk.sch.uk](http://hewett.norfolk.sch.uk)) that *Waiting for Godot* is about existentialism. 'Existentialism is a humanism,' says the famous existentialist Jean-Paul Sartre ([marxists.org](http://marxists.org)), contrary to what the Communists state and against what the Christians believe. I see. Humans are free and there is no God. As an existentialist, I exist, therefore I exist. In *Godot*, 'Vladimir' (Slavic for 'renowned prince') implies 'intellectual' and 'Estragon' (French for the herb tarragon) implies 'Earthbound' (Eugene Webb, [drama21c.net](http://drama21c.net)). In *Waiting for Godot*, both the intellectual and Earthbound existentialists wait for no one. I realize now that the US is both intellectual and Earthbound. I thought the US was capitalist, not existentialist? I see the US can't see climate change as capital.

Is *Godot* someone or something? The *Godot* I see is something, an accident of nature waiting to happen: climate change. Time and tide wait for no one; *Godot* waits for no one. Unless of course *Godot* waits for all of US.

Jak Peake also writes that 'the essence of existentialism concentrates on the concept of the individual's freedom of choice.' Therefore, Jak, rejecting the Kyoto Protocol makes the US an individualist, really an existentialist. And note that *Estragon* and *Vladimir* don't make a choice at all; they just keep on waiting, until the end. So, Jak, I take it that the US is waiting until the end. The Yankees dawdle and, having dawdled, dawdle on.

I note Jak makes the point that boredom or the waiting itself causes people to think; he writes: 'In *The Plague*, Albert Camus suggests that boredom or inactivity causes the individual to think.' Jak, I'm bored, and I think not – that's why I'm bored. And I don't think the US is thinking while waiting, or getting bored. The US is both capitalist and existentialist.

There's more to *Waiting for Godot* – and the *Yankee Dawdle* – than meets the critic's eye. Published as a French play in 1952 as *En Attendant Godot*, Beckett himself translated it into English and produced it in London in 1955 and the United States in 1956 as *Waiting For Godot*. REA says ([enotes.com](http://enotes.com)):

Beckett's play came to be considered an essential example of what Martin Esslin later called 'Theatre of the Absurd,' a term that Beckett disavowed but which remains a handy description for one of the most important theatre movements of the 20th century.

So, the play *Waiting for Godot* belongs to the Theatre of the Absurd, that which is 'one of the most important theatre movements of the 20th century.' Absurd!

Samuel Beckett won the Nobel Prize for Literature mainly for *Waiting for Godot*; that to me means the Nobel Prize Committee appreciated the absurd one day in 1969. Unlike the US, which has been in awe of the absurd since the Kyoto Protocol in 1997, or 10 years ago. Some people just never learn.

Beckett himself called his play a 'tragicomedy' (Paul Davies, TLE, [litencyc.com](http://litencyc.com)) in which 'nothing happens, twice,' since the two acts are 'in several respects repetitions of each other.' Not this one. Climate Change is a one-act play, and

'all the world's a stage / And all the men and women merely players' – if and only if, As You Like It.

Stacy Tartar makes the point (brainstorm-services.com) that Beckett's play is that of two educated men waiting for Godot on a lonely country road. If they're educated, they wouldn't be waiting on a lonely country road, for they would know that there is at least one other road to take. Why, they must have read Yankee poet Robert Frost's 'The Road Not Taken.'

I take it that the US refuses to acknowledge the Kyoto Protocol if only to protect her economy, that the US is thereby telling the world that a mere scrap of paper with some unreadable signatures is enough to burn down the house built upon the rock called the United States of America, the greatest civilization ever. O men of little faith!

Or, the US is merely taking the safest route, that which is described by CS Lewis in these words:

The safest road ... is the gradual one – the gentle slope, soft underfoot, without sudden turnings, without milestones, without signposts.

The safest road CS Lewis is referring to is? Hell.

I know. No, Waiting for Godot does not reflect the human condition – and neither does the US waiting for Godot. Or waiting for Al Gore.

If the millions of people in the rich nations like the US won't cooperate, we are more millions in the poor countries who can make the difference in climate change. Then we will have shown the rich that the poor can see the options even when the rich can't.

Now, if you want to see millions of poor, go to India – of course, we also have some in the Philippines; try Manila for size – make a special trip to Patancheru in Andhra Pradesh, which is where you find the campus of Team ICRISAT. ICRISAT is into what I like to call climate crops (sweet sorghum for bioethanol and maybe Jatropha for biodiesel), and the Institute has proof of concept in entrepreneurship in the form of an ethanol manufacturing plant (Rusni Distillery) using as feedstock sweet sorghum grown by thousands of Andhra Pradesh Indian farm families.

With its mantra 'Science with a human face,' ICRISAT is actively changing the way science serves the hundreds of millions of people in the drylands of Africa, Asia, Australia and Latin America. Aware of the climate changing, ICRISAT isn't waiting for Godot.

There's more where that comes from.

On 22 November, ICRISAT sponsored a symposium on 'Climate-Proofing Innovation for Poverty Reduction and Food Security' at its campus in Patancheru; Team Captain William Dar gave the opening address, 'Combating Climate Change through Innovative Science'. From what I understand of the speech, the title refers to four things to do in what I shall refer to from now on as My A List:

- Enrich the poor – Add to the small farmers' net incomes by growing high-yielding crops such as sweet sorghum varieties bred by ICRISAT.
- Add to the food supply – Growing high-yielding sweet sorghum in marginal areas, the grains can be processed as food for people or feed for poultry, as well as the stalks and leaves can be used as fodder for livestock.
- Cleanse the air – Growing high-yielding sweet sorghum in marginal areas adds to vegetation that cleanses the polluted air of carbon dioxide and converts the same into not only food and feed but also forage, fuel and fertilizer.
- Subtract gasoline – Growing high-yielding sweet sorghum in marginal areas adds to vegetation that not only cleanses the polluted air of carbon dioxide but also produces the raw materials for bioethanol, a substitute for petroleum-derived gasoline for cars.

Note the construction of My A List, the next statement building on the previous; by that, I wish to dramatize the undeniable truth that by planting ICRISAT-bred sweet sorghum in marginal areas, four concentric benefits can be derived. Now therefore, My A List shows that sweet sorghum is A Convenient Fruit. Climate change has brought out the best in a crop, thanks to Team ICRISAT.

In his opening speech at the climate change symposium, Dar says that the key strategy adopted by ICRISAT towards climate-proofing its innovation is 'sub-optimization for resilience.' If I understand that correctly, ICRISAT is aiming at, for instance, concerning water:

- (a) Conserving water by breeding crops that use less water but yield more
- (b) Designing & advocating cropping systems that use less water but produce more
- (c) Showing how villagers can use less water and have more.

Dar tells us that, in fact, with ICRISAT techniques derived from resource management studies with farmers, the drylands of India can produce 5 tons more (an increase of 4.6 times) grains a hectare a year supporting 15 persons more (an increase of 4.3 times) than under current farmer's practices, that is, only 1.1 tons of grains supporting only 4.8 persons. I'm glad the experts are learning from the farmers!

That is not to mention ICRISAT breeding its 5 mandate crops – pearl millet, sorghum, chickpea, pigeonpea and groundnut – and producing varieties that tolerate a warmer world, that resist pest and disease attacks. Specifically, Dar tells us:

*To cite a few instances of our successes so far, we have ICCV 2, the world's shortest-duration kabuli chickpea variety that matures in 85-90 days, escaping terminal drought; groundnut variety ICGV 91114 that is popular in Anantapur District for its ability to withstand drought, and pigeonpea hybrid ICPH 2671 that is highly resistant to two major diseases – Fusarium wilt and sterility mosaic.*

When Dar says 'we,' he means Team ICRISAT, who working together came up with superb performances. Part of the secret of success of Team ICRISAT is that it has itself created a larger team by partnering with many an institution in Africa and Asia as well as within the CGIAR. Even bigger than that, we have almost all the countries in the world pitching in to mitigate climate change, and we will win – if only we can get the Yankees off their dawdle.

With its mantra 'Science with a human face,' ICRISAT is actively changing the way science serves the hundreds of millions of people in the drylands of Africa, Asia, Australia and Latin America. Aware of the climate changing, ICRISAT isn't waiting for Godot.

*– Published 28 November 2007 in American Chronicle*







**JATROPHA MATH?  
SCIENCE SERVES THE PEOPLE WHEN  
MEDIA CREATE CRITICAL MASS CONTENT,  
NOT DISCONTENT**



**A**mong what I call climate change crops, Jatropha is a strange species in science. Among the paths to take on the road to creative writing, math is a strange device. Stranger than fiction? In truth, that's what I'd like to invite you to find out. (I'm no stranger to fiction myself.) What about the mass media? In the Philippines, judging from their performances in many an attempted coup, I think the mass media know about critical mass; what they have to learn is creative content and to differentiate it from creative contentiousness, which like Jatropha can be beautiful and contain its own poison.

Nonfiction: Since I can't find a textbook or manual or guidebook on how to translate the language of scientists into the language of the marketplace, since I don't know of any course on how to write on R&D for non-R&D people, I have decided to write the book on how to popularize science, starting with generating creative ideas from out of the blue. To be meaningful to the people, science writing must come with the promise of added income as reward for honest & productive manual, mechanical or intellectual labor. Anyway, that's the usual promise of science journalists; it has been that for the last 50 years at least. That's the promise of *Jatropha*, according to its advocates. To empower, to transform the mendicant, dependent, non-enterprising poor into self-reliant families – yes, I wish to focus on families, not simply individuals, not simply women – science writers must help cultivate the virtue of entrepreneurship, not adventurism, for citizens to add value to raw materials for consumers and to add value to their own lives, not depend on others to define their own lives. Entrepreneurship is risk-taking. As of today, scholars in universities, policy makers in government, columnists in newspapers, hosts on TV recognize only one risk, and that is population explosion – and the solutions proposed are represented in one object of their desire: the condom. Not a very creative device, I must say, not to say an inconvenient ruse. That is to say, they have reduced the art & science of social progress to the size of your prophylactic.

Science writing must also be aimed at the national government, local government, as well as scientists themselves, not to mention ambitious politicians and pretenders to the seat of power. Governments think science is for scientists, and the scientists agree. Ladies and gentlemen, let us realize that science is far too important a subject to be left to scientists alone! Science writing must be for the people at one end (feedforth) and from the people on the other end (feedback). Science without feedback (that is, supply-pushed) is devoid of common sense; with feedback, science gains relevance (that is, demand-driven).

In the Philippines, to many journalists, it is more exciting and psychically rewarding, if not financially so, to be pursuing the adventures of the Cute Crusaders in the Senate and the Pied Pipers of the House of Representatives who want to topple the administration of President Gloria Macapagal Arroyo. If

*Dar says the highest yield of *Jatropha* they have so far gotten at the ICRISAT campus in India is 1.5 tons a hectare; given the better soils and climate of the Philippines, he says, you can double that to give you 3 tons, but not more, not 5, certainly not 10 tons.*

you aren't using your head, you'll find it easier to be anti than to learn to do the best you can in whatever you ought to be doing. You owe it to yourself first.

With science writing, I can't blame the journalists – the schools didn't teach them how to popularize science, that is to say, translate science into the language of the homes, offices, farms, waters, villages – the languages of the consumers. The schools taught them the who, what, where, when, why and how and not much else; if not that, then the students didn't learn much more – which points back to the schools: If the students hadn't learned, the teachers hadn't taught.

There is also of course the science journalism of the know-it-alls: If you do it this way and no other, you will become rich, or richer. Their science journalism is reduced to a magic formula and all the science consumers have to do is follow the directions on the label. Their science is simply an instruction book. With your Core 2 Duo PC or your Nokia 5310, yes, you simply have to follow the user manual. But science must be an intellectual exercise; it must be a judgment call; there are many ways about it.

That brings me back to *Jatropha* as 'fuel for thought' (Yolandi Groenewald, 25 September, Mail & Guardian, mg.co.za). As to the science (embracing technology), how do you write creatively about *Jatropha*, which Filipinos call tubang bakod (hedge fence), which scientists like to call instead with the Latinized name *Jatropha curcas* that only they can understand? You have to be open-minded about *Jatropha*, a controversial species.

I have in mind right now what I call the 5 Os of creative writing and I shall now illustrate how to use them using *Jatropha* as the inconvenient fruit. Please note that the 5 Os are not stages in the creative process; they are not steps – you have to observe all the 5 Os, in any order, to be able to write well; the 5 are simply guides in writing:

## **(1) OPEN-MINDEDNESS**

On one hand, the Philippine National Oil Company (PNOC) has said that farmers can harvest as much as 5 to 10 tons of *Jatropha* fruits a hectare a year and earn as much as ₱50,000 from marginal lands almost as a sure bet. PNOC also has claimed that *Jatropha* has no known pests or diseases and is therefore an ideal crop. On the other hand, Director General William Dar of ICRISAT has asserted that there is really no science behind *Jatropha*, meaning that there have not been reported and repeated formal experiments and trial plantings of *Jatropha* whose consistent results could be used as basis for asserting information or sharing insights on this species. And there are a dozen diseases of *Jatropha* growing in the field. Dar says the highest yield of *Jatropha* they have so far gotten at the ICRISAT campus in India is 1.5 tons a hectare; given the better soils and climate of the Philippines, he says, you can double that to give you 3 tons, but not more, not 5, certainly not 10 tons. I believe ICRISAT.

What then is a poor science writer to do? Be open-minded and check out the counter-statements by asking other experts on the subject. Also search for available local literature on *Jatropha*. If possible, go visit a farm where *Jatropha* is being raised in commercial quantity, at least the seedlings. Visit the PNOC offices; sorry, you can't simply visit ICRISAT offices (they're in India), but you can email [w.dar@cgiar.org](mailto:w.dar@cgiar.org). If you're near enough, you can also visit the UP Los Baños (University of the Philippines Los Baños) as they have been quietly conducting a study or two on this species. Not for nothing is UP Los Baños one of the premier universities of agriculture in Asia.

## **(2) OUTSIDERS**

Outside of local literature, outside of local experts, you need to go to sources of data and information outside the Philippines. You're in luck; the Internet has been waiting for you for the last 20 years. Yes, the Internet is a wonderful knowledge source in most any subject; I thank God for the Internet. I can put in much content because of the World Wide Web. The only ones I avoid when I surf the Web are the bloggers because I don't want to be influenced by their opinion of the subject of my search for knowledge. They are entitled to their opinion; I am entitled to mine and I don't want to arrive at mine by first consulting others. And, my friends, that has made all the difference in my creativity.

## **(3) ORDER-DISORDER**

After your background research, you now have much information in your hand, including conflicting data. Thank God for that! There is no more exciting thing to write about than a controversial topic, if you know what I mean. But now you have a real problem in your hands: how do you organize all that data and all those bits and pieces of news and features so that you can write your own intelligent, interesting story or essay that you can be proud of – given the position you are going to take, whether for or against *Jatropha* as a viable source of biodiesel for cars and trucks in the Philippines.

## **(4) OBJECTS OF DESIRE**

On one hand, objects of desire to be a good writer, to make sure your language is that of the marketplace, I recommend that you install in your personal computer these: a dictionary (I have the Microsoft Bookshelf 2000, which is in fact the American Heritage Dictionary in electronic form, the best dictionary, I say), a thesaurus (I have the Microsoft Encarta Dictionaries), an encyclopedia (I have the Encyclopedia Britannica). If you can't afford such software, there is always the Internet. The dictionary helps you understand terms and the long words that scientists are very fond of using, such as utilize instead of use, or experiment instead of test, or implement instead of do. The thesaurus helps you find the

better (if not the best) word for what you're thinking. The encyclopedia fills in the gaps of your knowledge or understanding. You can be so lucky!

On the other hand, objects of desire by readers include as many names, anecdotes, examples as you can put in. Again, if nothing else, the Internet can provide you materials for your article on *Jatropha*, such as these:

In an oil and fats conference in China (12 September, [uk.reuters.com](http://uk.reuters.com)), experts warn that *Jatropha* is not the magic biodiesel crop because it's toxic and so requires careful handling by harvesters in the field and workers at the crushing plant; essentially a wild plant, the yield of this species varies from year to year. In the same conference, MR Chandran says it will take about 5 years of extensive research before *Jatropha* can become a viable source of biodiesel. The yield is less than 2 tons a hectare (note that ICRISAT says in their campus in Andhra Pradesh, the yield is 1.5 tons.)

Angela Hind reports (8 July, [news.bbc.co.uk](http://news.bbc.co.uk)) on a *Jatropha* joint venture between UK energy giant BP and D1 Oils. 'There is no doubt about it,' says Sanju Khan of D1 Oils, 'those who are working with *Jatropha* are working with the new generation crop, developing a crop from a wild plant.' Did you notice? 'Developing a crop from a wild plant' – *Jatropha* is not quite ready as a cultivated plant, much less as a good source crop for biodiesel.

You can find more *Jatropha* data and information from the Internet. I googled simply for "*Jatropha*" and got 648,000 English pages with Safesearch. If you want to write well, you have to search well.

## **(5) OVER & OVER AGAIN**

One of my favorite Rudolf Flesch quotes is this: 'There is no good writing – only good rewriting.' I believe Flesch because he writes like he talks, and he invented the Readability Formula that journalists worth their salt in the world religiously use, especially the American columnists and writers of books. There is no good story or essay except the one that has been reviewed, revised, rewritten at least 3 times in 3 different occasions (or days). You need to get away from what you have written so that when you get back to it, you have fresh eyes and can see better what to reject, what to retain, what's missing, what's well-written.

Finally, there's *Jatropha* math. Remember what ICRISAT knows – and doesn't yet know – about *Jatropha*.

At anytime during your writing, whether at the beginning, middle or end, to generate more ideas, in his book *How To Write, Think And Speak More Effectively* ([amazon.com](http://amazon.com)), Rudolf Flesch recommends math, that which you already know, *My Dear Aunt Sally*: multiplication, division, addition, subtraction. Like this:

Multiply what you have. Application: Stretch the argument of someone to the point of absurdity. From one basic proposition, derive one or two corollaries; the reverse is to generalize from particulars. From one observation, generate a few insights. For instance, *Jatropha* is poisonous – so it's (almost) impossible to dispose of the wastewater safely. And why do you have to work with poisonous material? Grow sweet sorghum instead!

Divide what you don't quite understand; for instance, break down a vague subject into something graspable, or reduce a big subject into smaller topics. For instance, *Jatropha* is a wild species – so, how do you tame it so that it will grow as a domesticated species? Don't throw into the same article anything about fertilizers, pesticides, organic farming.

Add more of the same, or something different, to make it more attractive to your reader. Add more variety, more elements, more illustrations. For instance, perhaps, you can grow *Jatropha* not as the single source of biodiesel but as an alternate source. Or, grow *Jatropha* without opening forestlands.

Subtract something you have difficulty handling, delete that which isn't so convincing or which makes dull reading. For instance, the promise is something like \$1,000/ha as income for a grower of *Jatropha*. If you can't handle that, if you think it's too much, don't mention it – or check your data from some other sources.

*Jatropha* math: You don't have to perform all the operations at the same time; you don't have to perform all the operations at one time, just one. And you don't even have to perform addition or subtraction first before division or multiplication. Just do it!

Am I therefore recommending that you take the path of math in your own creative writing? Yes; in fact, that's what I have been doing all of the past 42 years, from 1965 when my friend Manny Alkuino gifted me his own copy of Flesch's book after having seen that it has become my object of desire.

Rudolf Flesch's math helps explain why, while I'm not always right, I'm always original.

*– Published 3 December 2007 in American Chronicle*



**THE INDIAN RAINMAKERS.  
TO PRAY FOR RAIN, BUILD A POND &  
GET RID OF THE WITCH DOCTOR**



**P**eople, water is every country's greatest natural treasure, I say – no, people are not resources; they're more – but we take water for granted until there's a drought, we take people for granted until we know they're not coming back. That's when we lose not only the water, not only our loved ones but also our reason. We pray.

I know, God works miracles; that's why it's easier to pray for rain than to work for it. That explains why the harvest is plenty but the workers are few. Now, do not pray the Lord of the Harvest will send more workers; rather, send yourselves.

What kind of workers? All kinds. Everyone. Believers all. Believers all in themselves.

No, do not pray for the Lord of the Harvest to send more rain; rather, send yourself to harvest more.

While the people of the State of Georgia in the USA were praying for rain, the people of Raj Samadhiyala village in the State of Gujarat in India were harvesting rain, literally, no thanks to the witch doctors. In fact, they have been doing that for almost three decades, since 1978. This is their story, as gleaned from the Internet as well as an ICRISAT 2006 report, that of TK Sreedevi, SP Wani, R Sudi, Patel, T Jayesh, SN Singh and Shah Tushar entitled 'On-Site And Off-Site Impact Of Watershed Development: A Case Study Of Rajasamadhiyala, Gujarat, India'. The report was part of the research project 'Participatory Watershed Management for Reducing Poverty and Land Degradation in SAT Asia' funded by the ADB, the global Comprehensive Assessment of Water Management in Agriculture; the report was funded in part by the Government of the Netherlands.

The village: I prefer the other spelling of Rajasamadhiyala, which is Raj Samadhiyala, because it dramatizes raj, which means dominion or rule (answers.com); thus the Dominion of Samadhiyala. A village is a kingdom of itself if it wants to – and this story shows it. Raj Samadhiyala is a gram (village); each village in India is directly governed by a Gram Panchayat (Village Council). Panchayat literally means panch, 5, and yat, assembly; the Panchayat is a council of elders, '5 wise and respected elders chosen and accepted by the village community' (Wikipedia). The 5 elected elders choose among themselves their leader, called Sarpanch (head of 5), the 'ruler servant' of the village (Neelima Deshmukh, September 2003, iiasisa.be), the first among equals. As the village head, the Sarpanch 'plays a crucial role in shaping up the future of a village' even as he leads the village 'by his exemplary qualities' (hiwarebazar.org).

He succeeded in convincing the village people that demanding or begging from the Government is not the solution to their problems but joining hands is. A model village not only for Third World villages but also First World villages who suffer droughts just the same.

The power of the Sarpanch derives from the Indian Constitution (quoted in himalmag.com): 'The State shall take steps to organize village panchayats and endow them with such powers and authority as may be necessary to enable them to function as units of self-government.'

Self-government. Thus, the Panchayat makes 'every important decision in village political life,' and as head of the council, the Sarpanch 'has the ultimate say in any decisions' the Panchayat makes (Aasiya Lodhi, news.bbc.co.uk). The office of Sarpanch is 'the fulcrum of party politics on the one hand and development activity in the village on the other' (PC-NIC, planningcommission.nic.in). The Sarpanch can make or break a village, a King in his own right.

This story of the rainmakers of Raj Samadhiyala started in 1978 when Sri Hardevsingh Jadeja was elected Sarpanch. Jadeja, a postgraduate in English, believed in rajashahi (autocratic rule) (Sheela Bhatt, 2000, rediff.com). 'Without discipline no development is possible,' Jadeja said. He had a mind of his own.

At that time, Rajkot District, where Raj Samadhiyala lies, faced a major water drought. The groundwater table had receded to a depth of 250 meters below the Earth's surface. During the crisis, while Government experts debated how to bring water to the villages, Jadeja taught the villagers what their forefathers knew: how to harvest rain. 'Rainwater collection is not new to the world,' says RGPI (fralo.net); rain has been collected since 4000 BC in India, Asia and the Middle East. Going back to ancient history, that is how water became a major agent of change in Raj Samadhiyala (rainwaterharvesting.org). The Panchayat improved on itself by creating a larger body, a VDC (Village Development Committee), with 11 members representing each community (social caste) in the village (ICRISAT report). The VDC made all decisions in matters of development, and the elders in communities ensured that VDC policies and decisions were carried out. Here's a summary of what the people did in this Indian village:

- Instead of praying for the absent rain, they caught the present rain. They trapped the rain on the roof into water tanks to recharge their own thirsty homes.
- Instead of allowing the rain to run off from the farms, they build ponds to recharge their own open wells.
- Instead of allowing rainwater in other places to run off into rivers and streams, they trapped the water through check dams to recharge the thirsty underground water canals of their own village, their watershed.
- Improving on the check dams, they made dikes on the land where exist cracks underneath the Earth, and these replenished the water in underground canals so much faster, and the levels of water in wells, lakes and springs rose. By 2002, the underground water level had risen to 15 meters near the soil surface, a rise of 235 meters in 17 years (rainwaterharvesting.org), an awesome rise of 14 meters a year.

Necessary as it is, a village doesn't live by water alone. The ICRISAT report tells me that led by Sarpanch Jadeja, the Panchayat transformed Raj Samadhiyala from a village of lack to a village of filled needs, and beyond. A set of community rules were formulated and strictly enforced by the VDC to maintain discipline in the village. Aside from water harvesting, the village council generated and implemented several initiatives:

1. Widening of roads
2. Renovation of the Ram temple
3. Getting rid of witch doctors
4. Banning drinking of alcohol
5. Banning the use of plastics.

These were to address the economic, religious, medical, social and environmental concerns of the village. The wider roads move the fresh produce faster from farm to market. The Ram temple nourishes the faith the more. The fake healers have to be emasculated. Drinking encourages other vices, not to mention being quick to anger. Not biodegradable, plastics obstinately clog the canals and waterways. Everything considered: The people are not just individuals; they are families; they are a village. The village is greater than the sum of the villagers.

In 2002, with enough water harvested from the rains, the villagers of Raj Samadhiyala were now cropping 3 times a year, with much higher incomes from double cropping and farm diversification. The villagers were now planting high-value crops such as cumin, vegetables and fruits. Not only that, the supplies of food, feed, fodder and fuel improved as did incomes, literacy and social development. Raj Samadhiyala is a village in a new incarnation.

Sarpanch Jadeja had indeed 'transformed the village Rajasamadhiyala into a model village, totally crime-free and characterized by self-reliance, inter-caste amity and active community participation' (PC-NIC, [planningcommission.nic.in](http://planningcommission.nic.in)). He 'succeeded in convincing the village people that demanding or begging from the Government is not the solution to their problems but joining hands is.' A model village not only for Third World villages but also First World villages who suffer droughts just the same.

No, God's not impressed with rain dances but by the sincerity of the prayer. And there's no prayer more sincere than going ahead and doing it. This is the story of Raj Samadhiyala, a village in India whose prosperity started not by praying for rain but harvesting rain. And no, these Indians didn't pray that the Lord of the Harvest send them more workers – they sent themselves.

*– Published 10 December 2007 in American Chronicle*

## **AMERICAN CORN. FUNNY HOW GEORGE W BUSH'S BIOFUEL TRAP INVADES OUR ANIMAL PLANET AND WE GO APE**



I'm eating Yankee corn, and it tastes funny. Well, I've always known that the Americans are laughable. I'm a Filipino. Actually, I'm not eating corn; I'm eating chicken. I'm eating the chicken that ate the Yankee corn. It's not funny – it's expensive. Actually, I'm not eating chicken. My insides are eating me. You know, I'm debating with myself, and I hate it when I lose. I lose when I eat the Philippine chicken that ate the American corn because it's hardly affordable. The chicken or the corn? Both.

And that's all because the Yankees want to cash in on The New Green Gold. Hiroyuki Konuma, FAO Deputy Regional Chief for Asia and the Pacific says, 'The worldwide upsurge of interest in biofuels can best be described as the Gold Rush of the 21st Century' (adb.org). George W Bush wants the Yankees to lead in the new Gold Rush.

This time, the gold is not in dem dar hills; this time, the gold is coming from the sweat of the poor, and that they have plenty. It's Robin Hood in reverse.

You know the story of Robin Hood, of course – he who steals from the rich to give to the poor. I'll tell you the story of American corn – it's a joke; it's now made into ethanol for hungry cars, not food for hungry people. Robin Hood is a British invention of the mind that gives hope to the hopeless. Corn for ethanol is a Yankee invention of the mind that gives dough to the entrepreneur who is interested in bread and not in hope. The Americans are nutty optimists – in the doughnut, they see the dough and not the hole in it.

I believe corn is a joke as a bioethanol crop, just as sugarcane is. Shifting corn from feed to fuel, the Yankees have made a success out of a failure – they have solved the problem of high gasoline prices at the expense of food, meat, milk, eggs included. Opening more forestlands to sugarcane, the Brazilians have made a success out of a failure – they have solved the problem of high petroleum prices at the expense of the environment. Meanwhile, working with *Jatropha* as a biodiesel crop, the Filipinos go ape.

It's so funny I could cry.

US President George W Bush insists that the feedstock to produce ethanol from plants be the American corn, which scientists like to call *Zea mays*; it's amazing how corn goes into so many feeds of poultry and livestock, goes into so many food products that if you're making ethanol out of your corn, you're competing against the makers of food products who are forced to buy your expensive corn – so the food makers raise their prices, and all the poor consumers can do is raise the roof – and empty their pockets.

The Brazilians insist that the feedstock to produce ethanol from plants be the Brazilian sugarcane, which scientists like to call *Saccharum officinarum*; the plant's saccharine promise of energy security is at the expense of the forest which the Brazilian farmers cut down – the Brazilians solve a problem and create another, bigger problem. In response, the rest of the world can only create a ruckus.

On his part, Professor Teodoro C Mendoza of the College of Agriculture, University of the Philippines Los Baños has raised a howl with his paper of 17 pages 'Are biofuels really beneficial for humanity?' that appears on pages 83-98 in the December 2007 issue of the Philippine Journal of Crop Science. Do I agree with it as the journal's Editor in Chief? It doesn't matter; my policy is that I'll publish you even if I disagree with you 100% – I have the right to be wrong! And so do you.



My friend the Professor does not believe biofuels will solve the oil crisis. Neither do I – instead, I believe it will solve the climate change crisis.

Mendoza's main point is that 'Biofuels are the single greatest threat to food security especially for the low-income groups in view of their influence on supply and prices of staple foods.'

Aside from food insecurity, his major specific arguments against the use of biofuels as substitute for fossil fuels are, as far as I can see:

- (1) *Water is wasted.* Extraction of ethanol or diesel from plant matter requires tremendous amounts of water, threatening supply for other purposes, including home uses. Mendoza says a distillery needs about 10,000 liters of water to produce 1 liter of ethanol. Such a waste of water. Already, 1 in 3 people in the world is suffering from lack of water. Water is worth its weight in gold.
- (2) *Slops pollute.* Producing ethanol from organic material generates huge liquid wastes called distillery slops; each liter of ethanol made produces slops of 12-18 liters (sugarcane), or 13 liters (corn). Mendoza says the slops are highly acidic, polluting, foul-smelling.
- (3) *Encroaches on crop lands.* The need for biofuel lands will, Mendoza says, encroach on current crop lands as well as fragile environments, the ones that are too steep, too dry, or too barren. The farmers will then have to use more fertilizers; and since commercial fertilizers are derived from petroleum, that is solving a problem using the problem itself as the solution.
- (4) *Little impact.* By 2030, it is projected that the contribution of renewable energy (including biofuels) will be only 9%, which is a pity – yet, Mendoza says, 'its impact on water as pointed out earlier is so severe and on food supply so enormous ...' We're wasting TIME: time, initiative, money, efforts.
- (5) *Not energy efficient.* To produce 1 unit of biofuel energy, you need 25% more energy, Mendoza says. At best, you can get 1.2 energy units for every 1 energy unit you spend. Not economical.
- (6) *Destroys forests.* Mendoza says tropical forests are being cleared (in Brazil and Borneo) and replanted with biofuel crops (oil palm in Borneo, sugarcane in Brazil). Worldwide, we are losing (biodiversity) more than we are getting back (biofuel). Our economics is good but we need wisdom.

It is not an argument against biofuels if it is projected that they will contribute only a little to total renewable energy. We need more renewable energy and, I daresay, the projections are too pessimistic.

- (7) *Wastes energy.* In current farming methods, fertilizer energy is already 28% of the energy used in agriculture. Mendoza says the largest source of greenhouse gases is the chemical fertilizers. Indirectly. Along the way, a huge amount of oil is used to make the nitrogen fertilizer, then to transport it, then to store it, then to distribute it. Moreover, for every kilo of nitrogen, more than 10 kilos of carbon dioxide equivalent is released into the air. This is not to mention fertilizer leaching to the ground and to underground waters. More nitrogen fertilizer, more pollution.
- (8) *Leads to more problems.* Large-scale cropping is usually one-crop affairs, or mono-cropping, Mendoza says, which leads to soil erosion, nutrient leaching, and decline of crop resistance to pests (including diseases), which leads to the spraying of more pesticides. More of the same leads to more of the same.
- (9) *Results in more soil erosion.* Growing corn causes 50 times more soil erosion than hay crops, Mendoza says, so it cannot be environment-friendly. Soil erosion decreases soil fertility further, so it calls for more fertilizers to be applied.

Mendoza explains that because the supply of corn is being diverted to the making of ethanol instead of feed (for poultry & livestock) or food (for people), and since the US produces 40% of the world's corn and supplies 70% of all corn exports, whatever ethanol science the US practices on corn, that's the dominant science that applies. Thus, with American corn, science favors the rich. In Brazil, ethanol science is applied on sugarcane, but since it disfavors the environment, it is not sweet science either.

I know of an ethanol science that favors the poor, and it comes from the other side of the world, the land of Mahatma Gandhi, that is, India. The science is applicable to sweet sorghum as the feedstock for ethanol; sweet sorghum science has been generated by ICRISAT under Director General William D Dar who has headed the Institute since 2000. ICRISAT is pushing for a sweet sorghum biofuel cropping in the drylands of Africa, Asia, Australia and Latin America. And you can hear the sound of my two hands clapping.

Looking at ICRISAT's advocacy of biofuels, I shall now take another look at Mendoza's arguments against biofuels, and this is what I can say about:

- (1) *Water.* He is right about distilleries needing to use large amounts of water. This is one of the downsides of extracting biofuels from once-living matter.
- (2) *Slops.* Pollution from distillery slops can be avoided with the proper wastewater treatment technology. Slops are not unique to biofuels.
- (3) *Crop lands & fragile environments.* Biofuel crops encroach on crop lands because these are food crops: sugarcane, corn (not to mention, wheat, sugar beet, cassava, sweet potato).

As far as I'm concerned, and learning from Team ICRISAT, I believe sweet sorghum is the ideal crop for ethanol because it does not encroach on food crop lands, and it grows on fragile environments where sugarcane or corn will grow but poorly if at all. You don't have to fertilize sweet sorghum. The sweet sorghum grain is for food, yes, but the source of ethanol is not the same as the source of food: grain for the food, stalk for the fuel, unlike corn (only the grain) or sugarcane (only the stalk). (If you want more details on sweet sorghum, visit [icrisat.org](http://icrisat.org), email [w.dar@cgiar.org](mailto:w.dar@cgiar.org) or [b.reddy@cgiar.org](mailto:b.reddy@cgiar.org); Belum Reddy is ICRISAT's point man for the crop.)

- (4) *Little impact.* It is not an argument against biofuels if it is projected that they will contribute only a little to total renewable energy. We need more renewable energy and, I daresay, the projections are too pessimistic.
- (5) *Energy efficiency.* Mendoza is right if you use fertilizers and chemicals on your biofuel crop. Sweet sorghum is not a hardy crop if it doesn't perform well without those inputs.
- (6) *Deforestation.* This is true where Brazil and Borneo are concerned. Since sweet sorghum is a survivor crop and performs well where other crops fail, you don't need to cut down forestlands to give way to crop lands. If you don't believe me, go visit India where they grow sorghum in at least 10 million hectares ([icrisat.org](http://icrisat.org)).
- (7) *Wastes energy.* If you fertilize and spray chemicals on your biofuel crop, as you must with sugarcane and corn, you waste energy as Mendoza explains in his paper. But you don't have to fertilize and spray with sweet sorghum, so you save energy instead.
- (8) *Leads to more problems.* Mendoza is correct about mono-cropping; so, having learned that lesson, the planters of biofuel crops should practice multi-cropping, which is multi-hedging, one crop being a hedge against failure of another crop.
- (9) *Results in more soil erosion.* A corn crop, biofuel or not, causes so much soil erosion, because of tillage, bad practice. Controlling soil erosion is a matter of best practice. If you have a multi-cropping system, where you have corn and the other crops growing together and providing a complete canopy for the soil against the drop force of raindrops, you don't have soil erosion. When you think of biofuel crops, don't think only sugarcane, or only corn, or only sweet sorghum – think multiples of crops growing simultaneously in the same patch of marginal land and you should have marvelous results. Multiple cropping is not a new technology; its virtues have been touted at least since about 40 years ago even by the International Rice Research Institute (IRRI) itself which won the 1969 Ramon Magsaysay Award for International Understanding.

All in all, I'm a firm believer when it comes to biofuel crops. The European Union (EU) summarizes its position on the matter rather well ([ec.europa.eu](http://ec.europa.eu)):

The EU is supporting biofuels with the aim of reducing greenhouse gas emissions, boosting the decarbonization of transport fuels, diversifying fuel supply sources, offering new income opportunities in rural areas and developing long-term replacements for fossil fuel.

And yet, if you continue growing biofuel crops with so much fertilizer and so much pesticide, according to the good Professor, you are only adding to the pollution, not reducing it. And I agree. And if you are a Yankee growing corn for ethanol, you are the Sheriff of Nottingham robbing the poor to give to the rich. And only you and your Merry Men with all that fund will have all the fun.

*– Published 21 December 2007 in American Chronicle*

**NEW GAIA HYPOTHESIS.  
No RULES, No BORDERS,  
No LIMITS, No WHEELS?**



**Y**ou heard it once: 'Why reinvent the wheel?' You heard it a thousand times: 'Don't reinvent the wheel!' Once in a while, someone thinks: 'Why not reinvent the wheel?' I think differently: I'm a wheel – and I'm reinventing myself. Earth itself has been reinvented. Aristotle (384-322 BC) saw Earth as the center of our universe – the logic was obvious; Copernicus (1473-1543) made us see that our Sun is the center of our universe, our planets revolving around it ([csep10.phys.utk.edu](http://csep10.phys.utk.edu)) – the logical was wrong.

Earth is Gaia. The Gaia Hypothesis, proposed by British scientist James Lovelock in 1965 ([physicalgeography.net](http://physicalgeography.net)), looks at the whole Earth with a different perspective; Stephen Miller says the Gaia Hypothesis describes 'not so much a planet adorned with diverse life forms, but a planet transfigured and transformed by a self-evolving and self-regulating living system' (1989, [erg.ucd.ie](http://erg.ucd.ie)). Lovelock named his hypothesis after the Greek goddess who 'drew the living world forth from Chaos.' If you want to focus on the living world, the Gaia Hypothesis is stated more simply by Ozi: 'Our Planet – Mother Earth – is a Living Being and all life forms are her Offspring' ([ozi.com](http://ozi.com)).

But don't forget that the living depends on the non-living; they are One Life. The animate needs the inanimate to live. Ever heard of the Butterfly Effect? It's the Gaia Effect, as far as I'm concerned: 'A butterfly flapping its wings in Tahiti can ... produce a tornado in Kansas' (Erich W Weisstein, 1999, [mathworld.wolfram.com](http://mathworld.wolfram.com)).

James Lovelock saw a self-evolving and self-regulating living system and called it Earth. Unlike other planets, the whole Earth is alive as one organism. If you're still not convinced, note that because of the biofuel craze, with the United States and Brazil and many other countries hastily setting up bioethanol and biodiesel distilleries, and because the sources of biofuels are food crops – for instance, corn for ethanol – the prices of foods that have corn as an ingredient have jumped all over the world. And you know what? The sad effect of biofuels on food proves to me the Gaia Hypothesis. I see and call it Chaos.

Earth is One Earth, except that Man divides it into such territories as Africa, Asia, Australia, America, Austria, Azerbaijan, Antarctica, Vatican City, Zimbabwe. Or First World and Third World. Or Capitalist and Communist. Man divides the world into Muslims and Christians. Or Black and White. Or Fidels and Infidels. Man himself needs to be reinvented, but only Man can do it himself. And Climate Change is his last chance to do that, to become a New Man.

To address climate change wisely, as New Man we will have to revise the Gaia Hypothesis and reinvent the wheel.

To revise the Gaia Hypothesis, it is necessary for me to say initially that Man is a thinking creature and is capable of changing the world inside and out; therefore, Man has the choice between his willingness and his unwillingness to influence directly and indirectly Earth's self-regulating living system. Man is not helpless, unless he chooses to be, or unless lust blinds him of his options. Therefore, the New Gaia Hypothesis according to Frank states that:

Earth is a self-evolving and self-regulating living system with the influence of one species (Man) radically altering both effect and cause.

In that sense, Earth is the center of the universe. There may be other universes but I don't want to talk about them; I want to write about the universe that I can not only imagine but see, feel, touch, hear, taste, dig into. This revised Gaia Hypothesis is how I propose that Man look at climate change, with new eyes.



And with new eyes? Man can reinvent the wheel.

To reinvent the wheel, you have to think of it as both conception and contraption, the first whose time has come, the other whose time has come to an end.

As a contraption, the wheel is a circle with a hub in the middle, a dozen spokes all around, and a felly to keep everything in order, in check, in place – so that you don't go to pieces, you can go places, including to sites unseen, even to where angels fear to tread.

As a conception, the idea of the wheel is for going places where angels have never even imagined existed. The idea of the wheel is to be creative, not simply to move forward or backward, not simply up or down, 30 degrees or 45 degrees, 10 o'clock or 2 o'clock. The angels would know the wheel as a contraption; they are known for following order, not disorder; they can never be creative. Lucifer tried and look what happened.

We have to reinvent the wheel. Bruce Joyce says, 'We have to reinvent the wheel every once in a while, not because we need a lot of wheels, but because we need a lot of inventors' ([wsc.ma.edu/math](http://wsc.ma.edu/math)). Wheelers, if I may call them that.

To reinvent the wheel, for example, bring the mountain to Mohammed. Or create other Mohammeds, that is to say, teach people to understand why they must go to the mountain, why they must climb their own mountain. Teach them to search for the hows, and teach them to choose.

The mountain that we, all Wheelers, all Mohammeds, must climb today is The Mountain of Climate Change. Each of us must invest in that climb. Some of you have an investment in power for the millions of its potentialities – I don't see hope in you. Some of you have an investment in oil for the millions of dollars – I don't see help from you. I don't know about the rest of us. I have an investment in about 200,000 words so far in American Chronicle (2,300 in this one) for quite a few of the millions of people I'm crazy enough to hope to inspire with my own hope.

The insight I have gained from my little study of Climate Change is this: We Wheelers have to reinvent everything. Otherwise, what? Otherwise, everything will reinvent us.



I write about climate change because, whether I like it or not, the climate is changing me. I write about Earth because I'm an Earthling, and it's the best that I can do to influence my own species.

Actually, Man has been reinventing the wheel ever since the invention of – the wheel. In our time, the Internet has reinvented the wheel: today, you don't have to drive your car to fetch information from a remote village, or ride a plane to pick up the very first copy of a new book crossing the International Dateline.

The car is the wheel reinvented. The Yankees must become Wheelers and reinvent the car too – reinvent the car from being a necessity to being an alternative. Whatever happened to the car pool or public transport?

*Each one of these is the wheel reinvented:*

*Offsite job*

*Call center*

*Medical transcription*

*Home schooling*

*FedEx.*

In a related sense, my favorite search engine is already a Wheeler. Google reinvented the Internet search; now, Google's AdSense reinvents the ad.

We have to reinvent the farmer's farm too – why not a collective? Land tenure is an outmoded model of working with the land. You don't need to own the land to make it productive. And farmers have to learn to work with others.

We have to reinvent fire too, turning it into a New Fire. Instead of gasoline, alcohol. Instead of from the underground (petroleum), from the aboveground (plant). Instead of boring a deep hole to plant a rig, boring a shallow hole to plant a seed. James Lovelock, as it turns out, has a different seed in mind; he believes that 'nuclear power is the only green solution' (ecolo.org) – well, it's not green enough for me. I believe in Lovelock's Gaia Hypothesis but not in his Nuclear Power Hypothesis. I believe that in nuclear energy, Man is playing with fire; when you play with fire, you burn.

I suggest that New Man acquire the seeds of the New Fire called bioethanol from sweet sorghum (*Sorghum bicolor*), not sugarcane (*Saccharum officinarum*), not corn (*Zea mays*). Corn is the official Yankees' choice; sugarcane is the official Brazilians' and official Filipinos' choice. My genius of a choice is unofficial. I'm a Filipino and I have always been a rebel even without a case; that explains why I'm creative – to be creative, you don't have to be crazy, but it helps. Why the choice of crop? Because sweet sorghum grows well in disadvantaged lands where sugarcane or corn will only survive. Because sugarcane is sweet but sweet sorghum is twice sweeter –and therefore twice a better choice of energy for man or animal or car. Corn is a joke. My Bugong chicken (a Los Baños original), as well as your original Max or McDonald or Kentucky Fried chicken eats American corn, which as biofuel source has now become expensive – so, when I eat my favorite pricey chicken wing, I know I'm eating American corn even when I don't feel like laughing. Can you imagine that? A luxury for me, I pay the price of a chicken (\$3) for a joke.

'We should aim at generating a win-win situation for biofuel producers, food buyers and energy users,' says Thomas Elhaut, Director of the Asia and Pacific Division of the IFAD (adb.org). Yes Sir! To do that, IFAD says to do the right research, come up with the right policy, add the right investment. While you're working on all that, Sir, I suggest you leave the corn alone to the chickens.

Urooj S Malik, Director of Agriculture, Environment and Natural Resources, Southeast Asia Department, ADB, points out that the main obstacle to increasing biofuels is that the food producers and biofuel producers want the same piece of land (adb.org). Sir, that is because they are using the wrong crop for producing ethanol, that is, either sugarcane or corn, both of which are food crops. The battle between food and fuel is ignited by wrong logic. I mean: You can't have your corn and eat it too.

I know of a species with which Man can produce both food and alcohol, but not from the same part of the plant. Yes, it's sweet sorghum. You get the food from the grain, the alcohol from the stalk – no quarrel in that. Grain and stalk, each defined by its own border, each confined by its own limit. I mean: Sweet sorghum is the only crop in the world with which Man can mix food and alcohol with intoxicating, wonderful results.

If you wanted to plant sweet sorghum, where would you get your seeds? From the land of the corn: the United States. You have sweet sorghum grown extensively for food (syrup) in Southeastern United States, with the gulf states including Texas, Wisconsin, Kansas, Iowa, Minnesota; Kentucky and Tennessee lead in the making of syrup (ca.uky.edu). Sweet sorghum for syrup is also grown in Alabama, Arkansas, Georgia, Mississippi and North Carolina (Wikipedia).

Me, I would get my sweet sorghum seeds from India, specifically from ICRISAT headed by Director General William Dar and based in Andhra Pradesh. ICRISAT has developed improved sweet sorghum varieties and hybrids for the drylands excellent for purposes of food, feed, forage, fertilizer, fuel (green stalk for sugar for ethanol, crushed stalk for cooking). Experience not necessary, irrigation not necessary.

I write about climate change because, whether I like it or not, the climate is changing me. I write about Earth because I'm an Earthling, and it's the best that I can do to influence my own species.

Now, if I may repeat the New Gaia Hypothesis according to me:

Earth is a self-evolving and self-regulating living system with the influence of one species (Man) radically altering both effect and cause.

May I point out here that such influence is either conscious or unconscious, plain or muddled; such effect or such cause either direct or indirect, seen or unseen, appreciated or ignored.

Many of you don't want to acknowledge your role in the fate of the Earth; I expect that in the fight against global warming, you will simply throw a cold shoulder. Or throw a fit.

*Yet, smiling*

*I write for Earth Reborn in Chaos*

*Man loving Earth in such a way that*

*There is a climate change*

*From confusion to understanding*

*From doubt to faith*

*From injury to pardon*

*From getting to giving*

*From hate to love*

*From global heat to a global warming of the heart.*

*– Published 23 December 2007 in American Chronicle*

**THE SMART REVOLUTION.  
ETHANOL CORN OR SUGARCANE?  
'SWEET SORGHUM IS SMART' –  
WILLIAM DAR, ICRISAT**



**S**orghum makes a revolutionary theory: Smart! For biofuel, a paradigm shift from American corn to American sorghum, from Brazilian sugarcane to Brazilian sorghum, that's smart. From Philippine sugarcane to sweet sorghum. To make ethanol, corn is fine, sugarcane is sweet, but sweet sorghum is sweet smart. 'Sweet sorghum is the smart crop,' Director General William Dar of ICRISAT says over lunch on broiled chicken, sinigang na maya-maya (sour soup, fish), tea and sugarcane juice somewhere in Quezon City, Philippines, 11 January. 'A smart crop' – I wish I had thought of that.

Dar and I am with a common friend, Santiago R Obien, more popularly called simply SRO, Executive Director of Philippine Rice Research Institute (PhilRice), Retired; now consultant of the Department of Agriculture-Bureau of Agricultural Research (DA-BAR), my 'Wizard of Rice'. I had pleaded with SRO to make an appointment for us, as I wanted to thank Dar personally. He caused the publishing last November of my book, Team ICRISAT Champions The Poor.

And now Dar tells us, 'Sweet sorghum is the smart crop. What we need to start The Smart Revolution with is a smart crop.' Now I'm thinking: We're as smart as we think we are.

Born 11 January, The Smart Revolution advocates the enshrinement of pro-poor policies, among others. Sweet sorghum as source of ethanol is intelligent, not only because it is pro-poor. The Director General of ICRISAT enumerates four standards as his basis in saying sweet sorghum is a smart crop: food security, energy security, ecological sustainability, and water security. I write them down. He doesn't explain; I have no questions. Let's see if I'm as smart as I think I am:

(1) *Food security.* Corn and sugarcane are food crops. The Yankees turn X amount of corn and the Brazilians Y amount of sugarcane into ethanol and they are denying X/Y quantities to the food manufacturers, who will (gladly) raise prices, and thereby punishing their customers by having to pay the price for a public policy that their peoples did not declare. They should be ashamed of themselves!

Sweet sorghum grain is food, but the yield in grains to a hectare is only about 4% of the yield in stalks, 4 tons to 92 tons/ha (Belum Reddy et al. 'Sweet sorghum: A water-saving bio-energy crop,' [icrisat.org](http://icrisat.org)). To favor food and simplify, let me grant that the food yield of sweet sorghum is 10% and the stalk yield is 90% of the total harvest. Still, the ripple effect of the 10% is minimal, if visible at all. That reminds me of how the gifted Thomas Alva Edison defines genius: 10% inspiration and 90% perspiration. I don't like it; too much work for a genius to do. So, I'll take the 90% of sweet sorghum as my inspiration. A smart aleck, reversing Edison, I have been inspired to define genius as 90% inspiration and 10% perspiration. That should inspire others to help wage The Smart Revolution. Head first – assuming Heart – Hands later.

(2) *Energy security.* For a country to enjoy energy security, it will have to be self-sufficient and produce its own energy. For my country, since the Philippines has hardly any oil field, it means at least the fuel for cars and trucks must be tapped from crops, and the smart source for ethanol is sweet sorghum. What about the popular sweet crop, sugarcane? Okay, sweet sorghum is the smarter choice. It's also sweeter.

(3) *Sustainability.* Is it ecologically sustainable? Yes. Sweet sorghum can siphon off as much of the carbon dioxide in the air as sweet corn. The Ilocanos are a hardy people; they thrive anywhere. Like the Ilocanos of Northern Luzon in my country, sweet sorghum is resilient; so, it



can reclaim and enrich marginal lands like corn or sugarcane cannot. Sweet sorghum is an intelligent solution to a problem soil. A crop for the sagacious farmer, not to mention the sagacious entrepreneur.

Is this for the long-term? Yes. The growing of sweet sorghum and processing of its stalks into ethanol is sustainable. We have hybrid seeds of sweet sorghum coming from ICRISAT. We have the marginal lands waiting to be planted. We have the continuing demand for ethanol because of the continuing need to clean the air of carbon dioxide from the burning of gasoline, etc. And it's cost-effective. The cost of growing sweet sorghum is 4 times lower than that of sugarcane, ₱17,820 compared to ₱ 44,250/ha/year (Reddy et al. as cited). Here, less is more, and that's smart.

(4) *Water security.* Crops need to drink water too. A favored crop in the Philippines, sugarcane doesn't drink water – it gorges on it. For 1 crop of 12 months, sugarcane uses 36,000 cubic meters of water; for 2 crops of only 8-9 months, sweet sorghum sips only 8,000 cubic meters (Reddy et al. as cited). That's 78% less water; in other words, sugarcane wolfs down 4.5 times more water than sweet sorghum. This is shocking news, at least to me, as my country has been cultivating sugarcane commercially since the 18th century under the Spanish regime; in the 19th century, sugarcane became a major export (Jose Maria T Zabala, fao.org). A historical lack of intelligence. So, we Filipinos have been cultivating for 200 years a crop that is a wastrel of water. This is water under the bridge we can stop if we're smart enough.

Is the US smart enough to make a paradigm shift and make a sharp turn from corn to sweet sorghum? I doubt it. How about Brazil from sugarcane? As smart as the United States, I guess.

Let's be sharp and look at sweet sorghum as a smart crop by making a paradigm shift, this time in terms of an acronym that defines intelligence or brilliance: SMART.

*Soil-friendly.* Sweet sorghum is 'tolerant to drought, soil salinity, acidity, and toxicity' (2004, bar.gov.ph). 'It is high yielding, and tolerant to drought, water-logging and soil salinity' (new-agri.co.uk). That means, if your soil is dry, this crop will grow well; if your soil is wet, this crop will grow as well, if not better; it will also grow well in alkaline ('sweet') and acidic ('sour') soils. In other words, sweet sorghum is adaptable to many different sites. Flexible is smart.

All in all, I am convinced sweet sorghum is The Smart Crop, the great climate change crop. So, I say the smart set are Team ICRISAT, the Filipinos and other Asians, the Europeans, Africans, North and South Americans and others who are paying attention to climate change following the Kyoto Protocol ...

*Multiple uses.* I have a list of 5 uses of sweet sorghum: food (grains, syrup), feed (grains), fuel (firewood, ethanol), forage (leaves, stalks), fertilizer (the whole plant). Bedding, roofing, fencing and paper are added to the list of uses by NARI (Nimbkar Agricultural Research Institute) (AK Rajvanshi & N Nimbkar, [nariphaltan.virtualave.net](http://nariphaltan.virtualave.net)). While we are having lunch yesterday, I notice that the restaurant has 'sugarcane juice' and so we order a glass. It's good. Dar comes up with an insight: That's a good idea. Sweet sorghum juice is a good product. That's what I call a smart customer.

*Appropriate for the poor.* Sweet sorghum is a pro-poor crop. ICRISAT has a website dedicated to 'BioPower: Empowering the Poor through Bio-Energy' ([icrisat.org/biopower/](http://icrisat.org/biopower/)). Dar says, 'As a dryland crop, sweet sorghum requires far less water than costly irrigated sugarcane, making it more accessible to the poor.' Because it is soil-friendly, because it needs much less fertilizer, because of its multiple uses; and because a farmer can earn between \$1,250 and \$1,625 (at P40 to \$1) ([mixph.com](http://mixph.com)), not peanuts in my country, now I can tell you: Sweet sorghum is a smart man's choice of a poor man's crop.

*Research-supported.* Research on the crop at the NARI has been ongoing for the last 27 years (AK Rajvanshi & N Nimbkar, cited). The FAO and the UNDP of the United Nations have been studying in China the production of renewable energy, including from sweet sorghum, since 1988 ([fao.org](http://fao.org)). ICRISAT has been doing research on this relatively unknown crop for the last 12 years (Belum Reddy et al. 2007, [ars.usda.gov](http://ars.usda.gov)). Since 1996, the Chinese Shenzhen International Technology Promotion Center for Sustainable Development has been conducting research on sweet sorghum, resulting in five demonstration projects in China with a total production capacity of more than 10,000 tons/year ([unido.itpc.org](http://unido.itpc.org)). Their research has been smart.

*Technologically mature.* In a moment of awe, David A Fahrenthold reports that switchgrass has been called 'a Crop of Hope' ([washingtonpost.com](http://washingtonpost.com)). Yet, he notes that 'scientists haven't perfected the process that turns switchgrass into ethanol. So for today, the Crop That Could Change Virginia is just hay with better publicity.' The first commercial factory may not arrive for at least 5 years, David says. Not for my sweet sorghum, David. Bill Bradshaw reports that the pioneering project between Rusni Distilleries and ICRISAT to extract biofuel from sweet sorghum in commercial quantity bore fruit in June 2007 with the first batch of the ethanol flowing out of the distillery at Mohammed Shapur village in Andhra Pradesh, India, 'turning the dream into sweet reality' ([biofuelreview.com](http://biofuelreview.com)). Dar says, 'The project successfully blends ICRISAT's scientific capability in developing sweet sorghum varieties with higher juice availability with the entrepreneurial capability of Rusni Distilleries. This we have linked with the dryland farmers through the grassroots networking strength of our other partner Aakruthi Agricultural Associates of India (AAAI).' This is a multi-feedstock distillery, able to extract juice from not only sorghum but also sugarcane and corn. AR Palaniswamy, Managing Director of Rusni Distilleries

says, 'This ensures that we run the plant and provide employment to farmers throughout the year.' A wise entrepreneur cultivates farmers.

And the Philippines may be next to India in terms of squeezing the juice from sweet sorghum. In February 2006, Indian President APJ Abdul Kalam, accompanied by Dar, presented to President Gloria Macapagal-Arroyo at Malacañang foundation seeds of sweet sorghum bred by ICRISAT. With funding from the DA-BAR under Director Nicomedes P Eleazar and the Commission on Higher Education (CHED), the Mariano Marcos State University (MMSU) under Vice President Heraldo Layaoen started field-testing at Batac, Ilocos Norte (NPT, July 2007, [northphiltimes.blogspot.com/](http://northphiltimes.blogspot.com/)). One of the findings is that in the Philippines, sweet sorghum can yield 85-90 tons/ha in 8 months, much better than yields in India; I thought this indicated better soils in these islands ([frankahilario.com](http://frankahilario.com)). GMA has since been supportive of sweet sorghum for ethanol production. Smart President of her country.

I know for a fact that while it is based in India, Team ICRISAT has been pursuing a Rusni-type sweet sorghum initiative in my country starting last year. This year, next month, 27-29 February, CHED, DA-BAR, and the PCARRD are sponsoring the 'First National Sweet Sorghum Review and Planning Conference' to be held in Batac. Hundred participants are expected to attend: researchers, extensionists, policy makers, academicians, entrepreneurs, NGOs, farmers, concerned citizens. Overall, I expect an enlightened conference – and more sweet sorghum entrepreneurs.

The main objective of the conference is to develop a national framework for RD&E for sweet sorghum in the context of the biofuel needs of the Philippines. The scientists for sweet sorghum must think globally and act locally.

The centerpiece of the conference is the setting up of what is to be called the National Sweet Sorghum Research and Development Center. R&D: I'm not happy to note that the name does not exactly fit the framework; there's an important letter missing. Let me remind people to please not forget the art & science of Extension; E should always follow R&D. R+D+E: they're a team. Not only that. Consider that E today must include KM (knowledge management) – you have to sell theory so that practice will follow. Science is swell if you can sell well.

Related to extension, there's another E that I think should be integrated into any framework for a national sweet sorghum institute: Entrepreneurship. In cultivating sweet sorghum, entrepreneurship should also be cultivated among Filipinos, in either of two ways: (1) Encouraging the big businessmen to put up their ethanol distillery plants and encouraging the surrounding farms to supply the sweet sorghum stalks on a continuing basis. Big is big business. (2) Encouraging small farmers out of reach of a distillery to collaborate and build village-scale sweet sorghum-based industries such as for syrup, jaggery, wine, feed, food, fuel, and fertilizer. Small is also smart.

Reading further, strategic issues to be addressed in the conference involve, in my own words: (a) production, (b) processing, (c) people, and (d) public-private partnerships. I note that the title of the conference has the phrase review and planning. Good thinking. I also think that based on the range of issues listed to be discussed, the review is designed to be holistic, starting with the seeds and ending with what happens to the harvest, what are the benefits and who gets what. If you're broad-minded, you don't ever forget the distribution of benefits.

All in all, I am convinced sweet sorghum is The Smart Crop, the great climate change crop. So, I say the smart set are Team ICRISAT, the Filipinos and other Asians, the Europeans, Africans, North and South Americans and others who are paying attention to climate change following the Kyoto Protocol. Those who have been intelligently accepting the Kyoto Protocol, to them I say:

Sweet sorghum is smart money.

Sorghum makes a radical tease: Smart. Now, for the rest of us, which one are you: Smart cookie or smart mouth, those who have been foolishly rejecting the Kyoto Protocol, the peoples of the United States and Australia, to them I say:

While you're so rich, why aren't you so smart?!

*– Published 16 January 2008 in American Chronicle*

**TO HARVEST THE SUN.  
TO SOW THE WIND  
AND REAP THE WHIRLWIND**



**O**ctober 1988: Professor Hartmut Michel wins the Nobel Prize for Chemistry. January 2008: The feisty and prestigious Professor Michel continues to wage a campaign against biofuels, comes to the Philippines and wins over, among others, the feisty & prestigious Philippine Daily Inquirer – he doesn't win me to his side. Awe-inspiring Nobel Prize winners are not always right, and neither is the awe-inspiring Inquirer. To me, there is life in biofuels.

About all the world's biofuel strategy, biofuel is tragedy, in effect Michel is saying. More precisely, he calls it nonsense. Last year, in July 2007, the Professor delivered a talk he titled 'Biofuels – Sense Or Nonsense?' during the Lindau Meeting of Nobel Laureates ([lindau-nobel.de](http://lindau-nobel.de)). This is what I get from the website:

### *Biofuels: Sense Or Nonsense?*

*With this year's report of the Intergovernmental Panel on Climate Change (IPCC), it becomes generally accepted that the global warming which we undoubtedly observe, is the result of an increased concentration of greenhouse gases like carbon dioxide and methane in the atmosphere. Within this scenario it is evident that we have to reduce the emissions of carbon dioxide in order to stop or to decrease global warming. It will be necessary to switch from energy mainly based on fossil energy to renewable energy. One big hope is the use of biofuels like bioethanol, biodiesel, sundiesel, biogas and so on. The biofuels directive of the European Union requests that 5.75 % of all fossil traffic fuel (based on energy contents) has to be replaced by biofuels by the year 2010. Biofuels are of course products derived from photosynthesis of plants. It will be shown that the overall efficiency of photosynthesis is very low: less than one percent of the energy of the sunlight is stored in the form of biomass, and there is not much hope for a substantial improvement. Biogas and biodiesel per area unit and year contain about 0.4% of the energy of the sunlight which the area unit has received in the same time. In addition, at least 50% of the energy which is contained in biogas or biodiesel had to be invested from conventional (fossil) energy sources to produce the biogas or biodiesel. Therefore production and usage of biogas or biodiesel is also not carbon dioxide neutral.*

*In order to produce Germany's electricity consumption from biofuels, one would have to use the entire area of Germany for growing energy plants, even if one does not consider the energy input required to produce the biofuels. By comparison, usage of photovoltaic cells is more efficient by a factor of 50 to 100 with respect to energy conversion, and correspondingly less land is required. Growing energy plants therefore is a very inefficient way of using the land. The import of biofuels made of palm oil or soy beans from tropical countries will enhance the deforestation and lead to a loss of the tropical rainforest.*

*The Professor is saying a mouthful there: (1) There is global warming. (2) We must switch from fossil fuels to renewable fuels. (3) Biofuel crops don't make sense – they are inefficient. And they require the use of more fossil fuels. (4) Solar (photovoltaic) cells are more efficient. (5) Biofuels will result in the destruction of tropical forests.*

From my analysis of the Professor's statements above and from other sources, I can see that the Professor is making sense – and nonsense. Michel is right and wrong. I believe biofuel is not a tragedy and what Michel says is a comedy of errors. You can see that for yourself right now if you can think outside the box.



The German Professor is Director of the Department of Molecular Membrane Biology of the Max Planck Institute of Biophysics in Frankfurt, Germany. Planck, German of course, the father of quantum theory, was of the opinion that atheism was an obsession with symbols (Wikipedia). (Right! Thinking inside the box is an obsession with symbols.) While scientists were leaving Germany during the Hitler years, Planck 'felt it his duty to remain in his country' although he was opposed to some of the Government's policies, particularly as regards the persecution of the Jews' (nobelprize.org). In all my 68 years, I have never planned to leave my country and, yes, while I have been opposed to some Government policies.

Today I'm opposed to those who are opposed to biofuels if they don't know any better.

To change metaphor, in the eyes of Professor Michel, Nobel laureate in Chemistry, biofuels are chemical monsters (my term) that gobble up things on their paths, in the following ways:

- (1) Biofuels are eating up our forests.
- (2) Biofuels are eating up our energy.
- (3) Biofuels are eating up our food.
- (4) Biofuels are eating up our pockets.
- (5) Biofuels are eating up our common sense.

Where does Michel's science make sense, and where doesn't it?

## **(1) BIOFUELS ARE EATING UP OUR FORESTS.**

In an Inquirer report, T J Burgonio says that Michel points out that when a forest is cleared for biofuel, it 'destroys biodiversity and emits more carbon dioxide into the atmosphere' (newsinfo.inquirer.net). When you clear the forest and burn it, even I will say you lose more of untold wealth from Mother Nature: rich soil, vegetation that drinks huge amounts of the polluting carbon dioxide in the air, mild weather, nature's wonders and beauty, the watershed value; this is not to mention one of the scientists' major concerns, biodiversity, the myriad life



I have learned that this crop grows well most anywhere in fact, including waterlogged sites and marginal lands ... so you don't have to open forestlands for sweet sorghum plantations.

forms that make up the forest and in fact make the forest one living organism in itself. In fact, Michel says that when you burn a forest, you produce more carbon dioxide, not to mention that you incinerate natural compounds that could turn out to be remedies for new kinds of cancer or some other disease. I agree 100%.

But that is not a valid assumption, Professor Michel. You cannot assume that when Indonesians and Malaysians and Filipinos grow their palm oil, first they clear their forests and, then burn everything in sight. The clearing of forests is not a characteristic inherent in the growing of biofuels; it is a choice people make. So, you can grow corn (the Yankees' favorite), or sugarcane (the Brazilians' favorite), or sweet sorghum (my favorite climate change crop) without cutting down a single tree in the forest.

## **(2) BIOFUELS ARE EATING UP OUR ENERGY.**

Professor Michel points out that we are losers, not winners when we use plants (crops) as sources of energy, for two reasons:

One, the Professor explains: 'Photosynthesis is much too inefficient to store solar energy. Only 1% of the sunlight reaching the plant is stored in it. It's totally senseless to substitute biomass for fossil fuels' (Martin Bensmann, May 2007, [newenergy.info](http://newenergy.info)). He means that since there's not much energy stored in any plant, so why go for it? He says solar energy cells are 50 to 100 times more efficient catchers of the energy from the sun. No argument there.

Two, you fertilize your biofuel crop. Now, as Professor Teodoro Mendoza of the University of the Philippines Los Baños points out in his paper 'Are Biofuels Really Beneficial For Humanity?' 'a huge amount of oil' is consumed in the making, transport and storage of fertilizer. Let's take the case of the nitrogen fertilizer, as nitrogen is 'often the limiting factor in crop production.' That's about 2 liters of oil to 1 kilo of nitrogen. (Not only that. Mendoza points out that 1 kilo of nitrogen applied to the soil contributes to the pollution of the air by another 10 kilos equivalent of carbon dioxide.) That is to say, to produce and distribute and use fertilizer, all along the way you use fossil fuel – the one whose use you are trying to eliminate. I agree with the Professor: This is ridiculous!

But wrong assumption, Professor; wrong strategy too. You don't have to fertilize your biofuel crop, or any crop for that matter. That's exactly the reason I prefer sweet sorghum, because this crop grows well enough alone even without fertilizer. I have learned that this crop grows well most anywhere in fact, including waterlogged sites and marginal lands – so you don't have to open forestlands for sweet sorghum plantations.

That's not to mention that you don't have to have thousands of hectares devoted solely to sweet sorghum. Farmers can plant a legume such as pigeonpea after sweet sorghum, to enrich the soil for the next crop. Farmers know relay cropping. Farmers can also mitigate the risks inherent in single-crop farming

by growing several crops simultaneously to provide not only several sources of food and income but also insurance against the failure of any crop arising from the attack of any pest or disease. Farmers already know integrated pest management and multiple cropping.

### **(3) BIOFUELS ARE EATING UP OUR FOOD.**

When you grow crops for biofuel instead of food, this can cause food shortages (or food short circuits – my term). Professor Michel is correct. Surprise: Instead of growing the non-food biofuel crops, the Yankees insist on using corn as feedstock to manufacture ethanol, and the Brazilians insist on using sugarcane for their ethanol. Corn goes into the manufacture of thousands of consumer and industrial products; sugarcane goes into the manufacture of probably even more. Consider corn only, consider the multiplier effect of American cars eating American corn. What's eating the Yankees?

Now, let's think outside the box of corn.

I know at least one biofuel crop that does not threaten food supply in any manner. Botanists call it by a not-so-quaint name *Sorghum bicolor* (two colors, referring to red and green sorghum). Sweet sorghum is not a food crop like corn or sugarcane. And it's 'a smart crop'.

Again, wrong assumption, Professor, and wrong strategy. I said, 'When you grow crops for biofuel instead of food ...' why do you insist on using a food crop like corn or sugarcane to produce ethanol? In other words, you're playing with fire when you use a food crop to produce biofuel for cars. You don't need a food crop to produce alcohol, period.

### **(4) BIOFUELS ARE EATING UP OUR POCKETS.**

If you haven't seen The Multiplier Effect, come visit the Philippines now: American corn becoming the US' major source of ethanol has caused the increase in the prices of foods and related items not only in the United States but as far as in these Pearls of the Orient Seas, because we Filipinos eat American corn – we import our corn, joke or no joke, from the Yankees. Would you believe? We import American corn for the birds and the bees – we feed our poultry with American corn, and of course the fastfood restaurant Jollibee – with its Bee mascot attending to each of the many branches worldwide – serves delicious chicken fed with delicious American corn.

Again, wrong assumption, Professor, and wrong strategy. Because the US is using corn as source of ethanol; corn is a food crop as well as a feed crop – because of the sudden high demand for corn, the price of corn has gone up, so what are the food and feed makers to do? Charge more for the same, of course. Because Brazil is using sugarcane, a food crop. So, as Nils Blythe reports (news.bbc.co.uk), 'biofuel demand makes food expensive.' It's crazy.

Roy Huckabay, Executive Vice President of the Linn Group, says, 'When the energy markets went bananas over the last year, the value of corn as an energy source sky-rocketed.' So, the consumers have to dig deeper into their pockets to pay the high prices of foods. This is stealing from the poor to give to the rich, Robin Hood in reverse. If you insist, you must be under the influence of the Sheriff of Nottingham.

## **(5) BIOFUELS ARE EATING UP OUR COMMON SENSE.**

Professor Michel is correct, according to my favorite brilliant Senator, Miriam Defensor-Santiago (15 January, Donna Pazzibugan & TJ Burgonio, newsinfo.inquirer.net). She says:

Biofuel is land-based and will eventually compete with food. Because the Philippines has a small land area, biofuel production will tend to encroach on food production. Corporations are already searching for millions of hectares for *Jatropha* alone. We have to step on the brakes and decelerate.

Wrong assumption, Senator, and wrong strategy. You are allowing biofuel to compete with food – why should you? Even considering the high food prices, that corn for fuel competes with corn for food and feed is not an argument against bioethanol crops; rather, it is an argument against madness in using a food crop as a source of biofuel. That corporations are searching for millions of hectares for non-food-crop *Jatropha* alone, which is for biodiesel, is not an argument against biodiesel crops either. No Ma'am, I know we have a tiny country, but the Biofuels Act does not raise a serious debate on food versus biofuels. Rather, it raises a serious debate on strategy for biofuel production. Because of the assumed biofuel strategy, biofuel is tragedy.

In the same Inquirer report, Parañaque Representative Roilo Golez says:

There seems to be a mad rush to develop biofuels. A lot of resources are being committed, including millions of hectares of land and billions of pesos, on something that is now being debated.

There is a mad rush, Sir, I agree with you, all over the world, including in the United States, which has continuously refused to acknowledge the wisdom of the Kyoto Protocol adopted in 1997, can you imagine that? Millions of hectares are being committed, but not in the Philippines. No one can commit millions of hectares to any crop (except rice) in the Philippines – we have only a few millions to begin with. Unless you are referring not to cultivated lands but forestlands to be cleared or deforested sites to be cleared anyway. To be committed to assigning those millions to *Jatropha* alone, or to any biofuel crop for that matter, would be to be insane. To be or not to be, that is the question.

And Sir, biofuels is not something that is being debated (unless of course you're listening to Professor Michel) – rather, it is which plants (crops or non-crops) to use as biofuels. Such as the source for ethanol: The Yankees prefer

corn; the Brazilians prefer sugarcane; the Filipinos prefer sugarcane – Team ICRISAT prefers sweet sorghum. I prefer Team ICRISAT's choice if you ask me. Sweet sorghum is 'a smart man's choice of a poor man's crop' because it need not compete with food crops for site or size; it needs little fertilizer; it needs little water; it needs little pesticide. All things considered, sweet sorghum is cheaper and better than the other crops raised for ethanol. Sweet sorghum makes sense out of nonsense.

So you see, Professor Michel, it's all in the assumptions; it's all in the approach, it's all in the strategy.

In other words, the Professor is thinking only of one approach to the growing of any crop: mechanized, chemical agriculture. The farm machines gobble up gasoline or diesel (fossil fuels). The fertilizers you apply and the insecticides you spray against insect pests and herbicides against weeds are manufactured using loads of fossil fuels. You pump out gallons of water using gallons of fossil fuels. Mendoza (cited) says you need to pump about 10,000 liters of water to make 1 liter of ethanol. You are using your enemy to fight your enemy – so, the Professor is right; all the world's a stage, and it is the theater of the absurd!

But there is another approach that our Nobel laureate has failed to mention in the growing of any crop: Small is beautiful. Didn't German-British economist Ernest Schumacher teach us exactly that 35 years ago? Schumacher won my head and heart instantly. In homage, I named one of my sons after him. I've lost that son of mine, but I still remember him with fondness; I've lost my copy of Schumacher's book, but I remember him kindly warning us against big machines in the big farms. (I'm glad Time listed him one of a hundred heroes of the last century.)

So I say, in the spirit of Schumacher: Small farms, small machines, big heads, big muscles. Less and less is more and more. So: Less and less fertilizers. Less and less insecticides. Less and less herbicides. Less and less water. (Not to mention less and less middlemen.) Even big business in biofuels can be small farms taken together. Proof of concept? The Rusni Distillery producing ethanol from sweet sorghum is probably the world's first in relying for feedstock on Indian farmers in village clusters in Andhra Pradesh, India. Thousands of small farmers are planting sweet sorghum hybrids from ICRISAT; sweet sorghum as a biofuel crop is the work of Team ICRISAT.

While I disagree with the Professor in his fragmented approach to solving the problem, I agree with him in his conclusion that there is global warming and so we better do something about it. He tells his Manila audience that 'the Philippines is vulnerable to a rise in sea level and stronger storms as an offshoot of global warming' (Burgonio as cited). So, 'the Philippines has every reason to do everything to reduce the use of fossil energy.' Yes, the Filipino is worth thinking outside the box for.

The Professor suggests that the Philippines tap other renewable energy sources to generate power. 'The islands are rich in wind power. You should invest in wind to generate electricity.' I appreciate the suggestion. In this, I like to think Professor Hartmut Michel is saying, in effect, if you sow the wind, you will reap the whirlwind. And that makes an excellent energy source!

Nobody ever said 'Biofuels alone.' So, why not machines to harvest the wind and solar cells and sweet sorghum to harvest the sun? In Africa, Asia, South America. Then those harvests of seasons will be harvests of reason.

In the meantime, Manila remains the most polluted city in the world, and I'm referring only to the atmosphere. Consider: 1 million cars smoking carbon dioxide into the very air you breathe. Consider: Smoking is bad for your health.

*– Published 16 January 2008 in American Chronicle*



## GREY-TO-GREEN REVOLUTION. 2 LAUNCHINGS, 2 MODELS, 2 TACTICS



Outside the auditorium, the scenery was drab; inside, the scene was subdued. Early this week, some 250 delegates from the countryside and the cities were in attendance that first day of a national conference set 12-14 March in the City of Batac in Northern Philippines, and the first thing MMSU Professor and Emcee Josie Domingo said was, 'Ladies & gentlemen, we're making history!' Far at the back of the PhilRice-NTA auditorium, I heard her loud and clear. I also noticed nobody did clap. I didn't. It seemed a hyperbole worth not a laugh but a cold shoulder.

I said nobody noticed. We were about to launch the G2G (Grey-to-Green) Revolution in the country and nobody was excited. I wasn't. It must be that history is in the head, not in the eyes. History is not in the sight but in the foresight, more in the hindsight. You don't see history – you view history. You don't take a photograph of history with a flash bulb but with a flash of insight. Later, not sooner.

Or perhaps the delegates were thinking about the 15th of March, the day after the conference, the Ides of March, the day Roman Emperor Julius Caesar was assassinated, 'a day of infamy' (Jennifer Vernon, 2004, [nationalgeographic.com](http://nationalgeographic.com)). Would the first days of the launching prove to be in fact the last days of the National Sweet Sorghum Program of the Philippines, as in the case of the imperious Caesar who was slain by those who called themselves 'the liberators'? Perhaps, as when you wake up to reality, sweet dreams must die.

Today, 15 March, the ides of March, as I begin to write this, I realize we were making history, even if nobody else noticed. We were in fact launching a Revolution, even if nobody called it that – and with a crop hardly anyone talked about in the Philippines until last year. And the place where the unofficial declaration of the Revolution was made was as unpromising as can be: It is the auditorium of the complex that houses one of the stations of PhilRice as well as accommodates the National Tobacco Administration (NTA), and it is located within the campus of the Mariano Marcos State University (MMSU). When you declare a sweet sorghum revolt in the land of rice and tobacco, what do you expect? I can imagine blank stares and empty thoughts.

Most of the delegates had been to conferences before. Officially titled 'First National Sweet Sorghum RD&E Review and Planning Conference' – where R is research, D is development and E is extension – the Batac conference was sponsored by the DA-BAR, CHED, PCARRD, ICRISAT, and MMSU. That was a motley group that seemed unlikely to agree on one agenda, much less a modern-day Revolution.

ICRISAT scientist Belum Reddy came for ICRISAT Director General William Dar. CHED Executive Director William Medrano was in attendance. And so were Executive Director Pat Faylon and Crops Director Joy Eusebio, both of PCARRD. MMSU President Miriam Pascua was there. Provincial Agriculturist Norma Lagmay came for Ilocos Norte Governor Michael Keon. As National Team Leader for Sweet Sorghum as well as MMSU VP for Planning & External Linkages, Heraldo Layaoen was in effect directing the whole show. DA-BAR Assistant Director Teodoro Solsoloy attended for Director Nicomedes Eleazar. DA-BAR Consultant Santiago Obien came, being the brains behind the conference.

Have you ever heard of a revolt launched with so many distinguished individuals armed only with seeds of an undistinguished crop foreign to a country? Sweet sorghum was going to change the lives not only of the Ilocanos in the Ilocos Region but other Filipinos in the quiet countryside as well as the noisy cities

of the Philippines. The City of Batac was silently challenging Imperial Manila, raucous as ever, to behave intelligently. Cities now in competition, the crop of Manila was sour grapes; the crop of Batac was sweet sorghum.

I heard the Father of ICRISAT's sweet sorghum Belum Reddy call it the 'Wonder Crop.' ICRISAT Director General William Dar already calls it a 'Smart Crop.' I shall now call it the 'Sweetheart Crop.' We are referring to the same species: sweet sorghum. A witness to history made this week, I assure you Miracle Rice was never as good as this.

Yes, Miracle Rice happened in the Philippines, in the municipality of Los Baños, Laguna. And yes, the Sweetheart Crop happened in the Philippines, in the City of Batac, Ilocos Norte, at the campus of the MMSU. Miracle Rice gave birth to the Green Revolution in Asia; it was wrought by IRRI. The Sweetheart Crop is giving rise to the Grey-to-Green Revolution declared by ICRISAT. The Green Revolution happened in the time of President Ferdinand E Marcos, the Grey-to-Green Revolution is happening in his birthplace. Another heroism, another time.

If you visit the Ilocos Region in March, you will note that almost all of it is dry, drab, grey. The soils are poor in health and starved of moisture. They have been in such a poor state for ages. They are perfect for what I now refer to as the official launching of the G2G Revolution in the Philippines. Sweet sorghum is perfect if you want to go from grey to green because this crop has multiple uses and it thrives even on impoverished soil, which makes it indispensable in greening the Earth to mitigate climate change. With sweet sorghum, you grow your crop, you replenish the Earth.

In fact, the G2G Revolution was born and raised in Patancheru, India, within the campus of ICRISAT, with William Dar as Captain of Team ICRISAT. Sweet sorghum coming to the Philippines is like William Dar coming home to Santa Maria, Ilocos Sur. In 2000, Dar became the first Filipino (and the first and only Asian) to be the leader of ICRISAT. Belum Reddy is the Principal Scientist on Sorghum Breeding of ICRISAT; with the innovative leadership of William Dar, Team ICRISAT has successfully diffused the technology to a private investor so that now thousands of Indian farmers are growing sweet sorghum canes for

If you visit the Ilocos Region in March, you will note that almost all of it is dry, drab, grey. The soils are poor in health and starved of moisture. They have been in such a poor state for ages. They are perfect for what I now refer to as the official launching of the G2G Revolution in the Philippines.

Rusni Distillery, and everyone is harvesting from inspired inputs and learned labors. Science with a human face.

News on the successful Rusni-Team ICRISAT virtual partnership reached the Philippines last year; subsequently, Agriculture Secretary Arthur Yap and even President Gloria Macapagal-Arroyo had been enthused into advocating sweet sorghum as the source of bioethanol as gasoline substitute for Philippine vehicles to help mitigate global warming.

Now then, the G2G Revolution has crossed the seas and landed on our shores. This is the story so far, as I can see it in numbers:

2 Launchings, 1 Program

2 Models, 1 Resource

2 Tactics, 1 Revolution.

## **2 LAUNCHINGS, 1 PROGRAM**

On 12 March, Wednesday, within the PhilRice-NTA complex at the MMSU campus, Philippine Agriculture Secretary Arthur C Yap officially launched the sweet sorghum bioethanol program of the Philippines through his Undersecretary Mariz Agbon. My photo shows officials witnessing the ritual of crushing sweet sorghum canes using a big crusher run by a big tractor. The crusher used in the MMSU demo is in fact calibrated for sugarcane stalks, which are thicker than sweet sorghum; this inappropriate technology results in a lower extraction efficiency for sweet sorghum – not enough of the juice is pressed out by the rollers because their clearance is designed for thicker canes. Sammy Franco, Team Leader of the MMSU Sweet Sorghum Project, and who happens to be an engineer, now has a design of a new crusher in mind.

On 13 March, Thursday, in the village called Bungon just outside the city proper of Batac, the same sweet sorghum bioethanol program of the Philippines was launched through former Agriculture Secretary Leonardo Montemayor, in his capacity as President of the Federation of Free Farmers of the Philippines, as they are interested in the village-level potentials of sweet sorghum. The crusher used in the Bungon demo is a smaller version of the MMSU crusher and also imported. When the delegates arrived at Bungon, the farmers were already cooking the juice from some sweet sorghum stalks they had earlier crushed. I dipped the makeshift bamboo ladle into the vat, waited for the liquid that stuck at the end to solidify and bit the deep brown substance – that was sweet. In fact, it was sweeter than sugar because I happen to believe that sweet sorghum is more fit as a farmer's crop than sugarcane.

I attended both occasions mentioned above; the details are correct; my story is right: 1 program, 2 launchings. To understand how that could be right, read on.

## 2 MODELS, 1 RESOURCE

History was indeed made last week in the unpretentious little City of Batac in Northern Philippines with an exotic crop the scientists love to call *Sorghum bicolor*. The name of the species, bicolor, literally means two colors, referring to the colors of the grains of cultivars that range from pale yellow to dark brown (plantzafrica.com). That history made comprised these launchings:

- (1) The sweet sorghum distillery model was launched, a pioneer in the Philippines.
- (2) The sweet sorghum village model was launched, also a pioneer in the country.

With those launchings, the whole 3-day conference was intended to launch the sweet sorghum program for the Philippines, and that is exactly what happened.

The distillery model was the one launched at the campus of MMSU with Undersecretary Mariz Agbon representing Secretary Arthur Yap. This model could be like the one Rusni Distillery has put up in India in collaboration with Team ICRISAT. The crusher will be producing ethanol in large scale. The theme adopted for the Batac conference emphasized the big-scale model: 'Synergizing linkages for a commercially viable and sustainable bioethanol industry in the Philippines.' Big is beautiful.

The village model was the one launched at the village of Bungon within the city limits of Batac. Farmers own the crusher, and they would be turning the sweet sorghum juice not into ethanol but into jaggery for sale as well as for products that the markets of food, feed, forage, fuel and fertilizer would demand in small to medium scale. The theme adopted neither mentions nor implies village-scale sweet sorghum-based income generators, but these did come up during the conference anyway, as they should. This crop is for both gas and cash. Sweet sorghum is for the capitalist with his ethanol distillery as well as for the small farmers with their village-level multiple products. Small is also beautiful.

## 2 TACTICS, 1 REVOLUTION

The owners of the big distillery can take care of themselves, either supplying or accessing capital for the enterprise; but they still have to be convinced that sweet sorghum is worth the financial risk. The village model is designed in the absence of a distillery, for small farmers who need to pool their resources so that together they can have access to capital as well as management skills. One tactic they can employ is first to form a cooperative; as a matter of fact, the Bungon farmers have already done that, as the village head told us during the Bungon launching.

The distillery model makes sweet sorghum a capitalist crop, the capitalist with his big dreams. The village model makes sweet sorghum a farmer's crop, the farmer with sweet dreams.

I'm thinking of these creative areas as my reason for calling sweet sorghum a Sweetheart Crop for the big businessman as well as the small farmer:

- (1) Distillery for bioethanol and by-products of processing
- (2) Jaggery for sweet products
- (3) Grains for feeds, forage or foods
- (4) Bagasse for fuel or organic fertilizer.

The Ides of March for sweet sorghum? Close, but not quite. Plainly, communication was a problem during the Batac conference; problems with people, places, procedures and practices were noted and may remain for some time. Nonetheless, I have faith that the G2G Revolution in the Philippines, as initiated by Team ICRISAT led by William Dar in India and MMSU led by Heraldo Layaoen in Ilocos Norte, will succeed. In fact, Team ICRISAT is looking at the Philippine program as the Asian model for fuel – bioethanol for cars and trucks. And I, the eternal optimist, am looking at the Philippine program more than the Asian model for fuel – for the distillery and for the homes; it is The Sweetheart Species, the F5 crop: food, feed, forage, fuel and fertilizer. (To differentiate: Grains as component in the animal ration make feed; grains given as they come make forage). Thus, I see that sweet sorghum is on top of American corn (also F5 but is quite more expensive, as it has to be imported), and sweet sorghum is above Brazilian sugarcane (only F3 – cannot provide feed, cannot provide forage; even as food it is limited, as it has no grains).

Thinking along these lines, I can see in my mind's eye that in the global challenge called climate change, rising above all will be sweet sorghum, the champion in the dry tropics.

*– Published 17 March 2008 in American Chronicle*



## LESSON OF THE WATER CYCLE. AND DON'T MAKE HAY WHILE THE SUN SHINES!



**Q**uiz: If you really know The Water Cycle, tell me whose role is more important than that of the Water – and of the Sun? Answer: You'll never guess who, and I'm not telling you right away. Actually, I have already given you a clue. Water, water everywhere, but not enough to drink! April is the driest month in the Philippines, and even if I looked up at the sky imploringly and prayed fervently, I know I'm no pious Roman Catholic Rain Man. So today, 5 April Manila time, wanting to summon the rain, I do the next best thing and look at the next best place instead – the Internet. There's no drought in any search; you are deluged with more than what you've been looking for. Noah in his Ark couldn't have been more surprised.

Noah's was biblical reality; what Google gives you is virtual reality. Today, the Internet is where I will search for the visual reality of the water cycle. Is rain the most important part? Sometimes a vague notion ... I summon the rain today because I have a sneaking suspicion I'll find some precipitate of an idea there, some condensation of thought. And the Internet does not disappoint. I watch the old water cycle run its course again and again:

*-->The Sun evaporates the water from the sea --> The vapors form clouds denser and denser --> The winds push the clouds toward land and in a little while some clouds burst, dropping rain --> The Earth absorbs the rain, the roots drink it --> The leaves transpire while the streams run to the sea --> and the water cycle goes on and on.*

What is the essence of the water cycle? No, the British BBC doesn't distill it; the American NASA doesn't fathom it; and the Canadian University of Victoria doesn't catch the drift of it. I shall explain it in a little while after I present to you what my three world-renown sources have in their water knowledge tank.

Airing now, the BBC has an animated 2-minute color 'show' on The Water Cycle that you can play over and over, with the sound of water washing on itself or breaking against the riverbank ([bbc.co.uk](http://bbc.co.uk)). Play it again, John. In the wild blue yonder, NASA has a game for kids, 'Droplet and The Water Cycle' ([kids.Earth.nasa.gov](http://kids.Earth.nasa.gov)). Play it again, Sam. More down-to-Earth, the Wisconsin Department of Natural Resources has an EEK! corner (Environmental Education for Kids!) with color representation and the title 'Round & round it goes! The Water Cycle' ([dnr.state.wi.us](http://dnr.state.wi.us)). EEK! Except that the water cycle doesn't play itself – you have to use your imagination. Click on the next image and the next, if you wish.

It is ANN (author not named) of the University of Victoria that summarizes for me what the BBC, NASA and Wisconsin essentially know, and it is this ([educ.uvic.ca](http://educ.uvic.ca)):

*The water cycle is the only way that Earth can be continually supplied with fresh water. The heat from the Sun is the most important part of renewing our water supply.*

And now I'm compelled to say I agree with Victorian ANN's first assertion (on the point of only) while I disagree with the second (on the point of the most important).

On one hand, the first Victorian assertion is in fact a law of nature no one can quarrel with; it may help to call it 'The Fresh Water Cycle' instead. (It is so much unlike Evolution, which is not a law of nature but only a theory of one fallible human being called Charles Darwin. Evolution trumpeted, nay assumed as truth, is the arrogance of half of the scientists and liberal thinkers of the world.)

On the other hand, the second Victorian assertion is only half-correct. By definition, the heat of the sun is important because it strongly affects the course of events or the nature of things. In fact, without that heat, we die. Yet, the heat

of the sun is not an overriding consideration in the water cycle because the sun is there whether we like it or not. What is important is not there; what we do is important to the water cycle; in fact today, with global warming, what we do next is the most important of all.

'More crop per drop' is what CGIAR proposes that we do next.

I understand that 'More crop per drop' is a decade-old concept of the International Water Management Institute (IWMI). Now, with global warming, the whole CGIAR wants 'More crop per drop.' I congratulate the CGIAR. Those must be the most creative four words in the history of world agriculture.

In parallel with IWMI twice thinking out of the box, I hereby expand 'More crop per drop' out of the box:

- (1) More crops from drops of water
- (2) More crops from drops of fertilizer
- (3) More crops from drops of new seeds
- (4) More crops from drops of new grains of management
- (5) More crops from drops of kernels of knowledge.

And since I know more about ICRISAT – it also happens that I have been inspired while reading their in-house newsletter ICRISAT Happenings issue of 21 March (#1302). I'm going to explain all those drops by way of the work of Team ICRISAT.

*Drops of water.* According to the newsletter, one of the new operational research emphases of ICRISAT is on water scarcity in the semi-arid tropics. Team ICRISAT is helping in 'capacity-building on productivity enhancement initiatives in watersheds' for watershed officials from the Kadapa district of India, the country where ICRISAT is based. That tells me they are teaching people to teach people about watersheds. India has approved an ICRISAT proposal to screen against the bollworm some modern varieties of chickpea and pigeonpea grown in dry soils in that country. Aside those two crops, ICRISAT is advocating the planting of sweet sorghum, groundnut, pearl millet varieties that are drought-tolerant. Crops are precious, water is gold.

Blogging – now, you're talking my language. To borrow from Juliet talking to her Romeo (William Shakespeare, Romeo and Juliet, Act 2, Scene 2): Blogging is such sweet sorrow / that I shall say goodnight, till it be morrow.

*Drops of fertilizer.* Team ICRISAT, in collaboration with the District Watershed Management Agency and Department of Agriculture, Kadapa, India, organized a field day on 10 March at Kadapa to demonstrate the benefits of small-dose fertilizing (they call it ‘microdosing’). ICRISAT says: ‘Less can have more impact if appropriate fertilizer is applied to crops at the right time, in the right quantity, at the right spot.’ A pinch of fertilizer is enough. Small is beautiful.

*Drops of new seeds.* Team ICRISAT launched the Center of Excellence in Genomics 17 March at the ICRISAT Patancheru global campus, the facility being a joint project of ICRISAT and the Department of Biotechnology (DBT) of India. The CEG received a grant of US\$1 M as financial assistance from the DBT. The CEG is now fully operational. CEG will create biotech seeds of crops for the drylands of Africa, Asia, Australia and the Americas. New seeds, new hopes.

*Drops of new grains of management.* The International Center for Agricultural Research in the Dry Areas (ICARDA) and ICRISAT, both CGIAR centers, have submitted a concept proposal to the Science Council of CGIAR to co-manage a collective research program called Oasis as a Challenge Program, the hypothesis to prove being that (cgiar.org): ‘Better land care and livelihoods can both be simultaneously realized by protecting, rather than degrading the land.’ Use it, don’t abuse it. The Science Council has in turn challenged Oasis to show added value in terms of innovation to differentiate itself from being simply a compilation of ecology-based projects. (Perhaps they can come up with 1 or 2 measures or standards or indicators of land care and livelihoods that can be used in other places?) Research for the people, not research for the scientist.

*Drops of new kernels of knowledge.* ICRISAT has just surprised me today, 15 April – I wasn’t paying attention before – with this part of their strategy up to 2015, particularly in knowledge management, having recognized that (icrisat.org):

*More importantly, new collaborative opportunities in knowledge creation and sharing, as exemplified by the global Wikipedia’ (www.wikipedia.org) have emerged. Web-based content distribution technologies such as ‘Blogs’ have created unprecedented advantages for experts engaged in knowledge creation. All these technologies now enable ‘capture’ of both formal as well as tacit knowledge of an individual expert to make it available to a larger community that can take suitable advantage. Our goal is to make an expert’s knowledge available to any needy partner or stakeholder anytime, anywhere, through virtualizing presence.*

That was in 2006 yet! There are two things I’m interested in there. One, Team ICRISAT already recognizes the value added by Wikipedia to the world of knowledge management. It may be the first institution in the world to virtually, formally and openly affirm Wikipedia. Two, ICRISAT acknowledges the role that blogging does in creating and sharing information and insights.

*Bloggling* – now, you’re talking my language. To borrow from Juliet talking to her Romeo (William Shakespeare, *Romeo and Juliet*, Act 2, Scene 2): *Bloggling is such sweet sorrow / that I shall say goodnight, till it be morrow*. I already said somewhere that bloggling is the revenge of the unpublished writer. I think now that bloggling is the silliest as well as the most intelligent form of publishing ever invented. If you are silly, your bloggling is silly; if you are bright, your bloggling is bright; if you’re creative, your bloggling is not always right but is always fresh, always new, always interesting.

Now then, bloggling with a bird's-eye view, I see a different water cycle. My view goes like this – it is all water

*Wasted by people*

*Assimilated by vegetation*

*Transpired by vegetation*

*Extracted from soil*

*Retained by soil after harvest.*

*Wasted* – How much water do we waste at home, in the office? For instance, how many government offices in Manila right now have faucets leaking day-in and day-out even while they are not in use? Waste not whatnot.

*Assimilated* – Even while water is in good use, as in rice farming, the field is flooded for weeks. How much water can the rice plant appropriate unto itself to grow and multiply? Wetland agriculture is a great waste of water, and we don’t acknowledge it. Bad habits die hard.

*Transpired* – I have no quarrel with leaves giving off water vapors. Thank God plants transpire and shoot water up into the air to become clouds that become rain! I also give thanks that where vegetation is dense or where every spot of ground is covered with green living matter, the temperature is lower, the transpiration too.

*Extracted* – When we harvest our crop, that’s so much water extracted from the soil. If we don’t return the crop refuse to the soil right after harvest, that’s so much water robbed from the soil. Because every year millions upon millions of farmers don’t do that, water robbery is the farmers’ crime of this millennium – and of the other.

*Retained* – How much water is retained by the soil after a crop harvest? If the soil is bare – or plowed and purposely laid bare for days, as Filipino farmers are wont to do – you are evaporating the water from the ground as fast as convection can carry the vapors up.

And so, all over The Water Cycle, no matter how you define it, I see Man as The Water Cycler – that is to say, Man is the one who is crucial in all the stages. Man is the water waster at home, in the office, in the farm, in the field. Man refuses to heed the call of the soil for cover. Mother Nature teaches multiple cropping but Man is not paying attention. Man does not see the wisdom of returning to the soil what he gets from it; he does not throw back the crop refuse to return

much of the water and nutrients his crop harvested from that soil. Man in fact exposes the land to the terrible heat of the sun, without a green canopy for protection. If you're looking for a hedonist, you don't have to look far.

Because he affects the water cycle and in many ways badly, for all intents and purposes Man is The Water Cyler. Victorian ANN is wrong about the Sun; Man plays the most important role in renewing our fresh water supply, and his performance is terrible.

According to ANN of Ohio (units.muohio.edu), 'The water cycle is the way the Earth uses and recycles water. It's controlled by the Sun.' ANN of Ohio is also wrong about the Sun; it's controlled by Man.

Every intelligent farmer knows one technique to return to the Earth what his crop has extracted from it: green manuring. Edward H Faulkner knows a different way, and I think he knows better; the Faulknerian method is like this, in my own words:

*Don't make hay while the sun shines. Instead, make a surface trash mulch by rotavating the soil, cut-mixing it with the grass, weed, crop refuse. And no moldboard-plowing, please!*

Faulkner calls it 'trash farming' or 'trash mulch culture' (David Kupfer, 'The Organic Farming Movement,' [organicanews.com](http://organicanews.com)). This is not your usual green manuring because any vegetation can be used, along with the weeds, not only legumes, and it is turned into a mulch, not turned under the soil. Legumes don't have a monopoly of the truth about enriching the soil.

I learned the lesson of the mulch more than 40 years ago from a book I chanced upon in the library of the College of Agriculture of the University of the Philippines – Plowman's Folly. I taught my cousin Enso back in my hometown and he has been doing Faulkner's trash farming for 40 years and he has been getting much higher yields than his neighbors who have been copying everything he does but don't know this one. You don't return hay to the soil when it's dry – it's too late. (It doesn't do much good to the animals either.)

In Faulkner's trash farming, no water is wasted – the mulch keeps it there on top of the soil even as it becomes organic matter and enriches the soil. The water extracted by the crop is given back; the soil retains its moisture. Trash farming is a great way of harvesting water.

Man causes droughts and flash floods because he abuses the water and the soil. 'Water is the most studied material on Earth but it is remarkable to find that its behavior and function are so poorly understood (or even ignored), not only by people in general, but also by scientists working with it everyday' (Martin Chaplin, London South Bank University, 2008, [lsbu.ac.uk](http://lsbu.ac.uk)). I can see that. The ADB looks at water as an economic good and says it needs 'careful management' and 'a participatory approach' to conserve it (2006, [adb.org](http://adb.org)). The scientists are beginning to see that. 'Nearly three-quarters of the Earth's surface is covered with water' (Environment Canada, [ec.gc.ca](http://ec.gc.ca)). I don't see



that, and I don't have to. ANN of Canada, it's not the amount of water that's the problem – it's where the water is in The Water Cycle, and it depends on Man, The Water Cycler.

*Once Man learns The Lesson of The Water Cycle,*

*this is what Man will do next:*

*'More crops, more drops.'*

*Excellent!*

*– Published 20 April 2008 in American Chronicle*



**THE DRYLANDERS.  
SHORT-TERM CRISIS,  
LONG-RANGE SOLUTION. EXCELLENT!**



**T**oday, 19 April, in this humble Ilocano abode we ran out of rice. We have had a regular supply, free, of one sack of rice a month and delivered right to our doorsteps by IRRI as incentive to the staff; my son works there. Today, we have a rice shortage, as the rice man has not come yet. We are told there will be a delay of one week.



We'll wait but, in the meantime, we have to eat rice, even at 32 pesos a kilo, up at about 50% more in just a few days. That's highway robbery. Still, while gold is a privilege, food is a necessity.

The irony is that we live in Los Baños, where IRRI has been residing since 1960, and where University of the Philippines Los Baños has been in existence since 1909. When the 'market forces' act, families and institutions can only react. Economics is neither art nor science for the poor, even for this Ilocano.

'There is no rice shortage,' he tells the hundred hungry bodies attending the conference, slowly and carefully, 'only a rice price crisis.' He should know the workings of the economy; among other things, he was the Philippine Secretary of Agriculture in 1998, Presidential Adviser on Food Security and Rural Development as well as Executive Director of the National Agricultural and Fishery Council in 1999.

He is William Dar, now Director General of ICRISAT. We are attending the 17-18 April National Dryland Agriculture RDE Conference being held at the Oxford Hotel at the Clark Special Economic Zone in Pampanga, Central Luzon, Philippines; the theme is 'Energizing Research, Development And Extension For Sustainable Dryland Agriculture In The Philippines.' He is the last speaker; he has the last word.

Dar explains that there has been a 'tightening of the global supply of cereals because of drought.' The exporting countries such as India, Thailand, Vietnam, China are not selling much of their rice. The importing countries like the Philippines, Indonesia and Bangladesh can hardly buy from them; the Philippines can only import 325,750 tons this April, less than the tender of 500,000 tons (AFP, 18 April, inquirer.net). The exporters have to think of their own people also. In a nobody's market, the exporters are the choosers. Drought is not an equalizer – it's a divider.

We Filipinos have to import to stock up on the rice we have. We have to import because we are not producing enough rice to feed the population. Rice shortage, rice crisis. Man-made. 'I discovered,' said one of the participants in the conference, 'that my staff were buying one sack of rice every day.' They're not alone; they are the small hoarders. We don't know about the big hoarders. (I found out they are hoarding even beer!) So, half of the Filipinos have the rice that the other half should have. Comparatively speaking, in the short term, even at 32 pesos a kilo, today to buy is a small step for me, but a giant leap of mind for others yesterday to think of producing rice to be made available and affordable to the other half of the population of the Philippines in the long-term. Until now.

The reality is that in the Philippines, no matter the human population, even given the Green Revolution, historically the supply of rice from our farmers has always fallen short of the demand. Why does the Malthusian theory of population keep haunting the Filipinos?

Why do we keep importing rice when, not to mention the almost 50-year old IRRI, we have the 100-year old UP Los Baños, arguably the premier agricultural university in Asia? Because we, including UP Los Baños, never thought of drought; we have been thinking with what I shall call here The Rice Water Mentality, which runs like this:

*Our farmers have since time immemorial grown rice with flooded fields; so, flooding rice is a correct technology. It's a given. So, to increase rice production, Government and the private sector must support irrigated rice. So, we need a miracle variety, more irrigation facilities, more irrigated rice technicians, and more banks for more irrigation & crop loans, please!*

After Miracle Rice, Hybrid Rice is great such as it is (see 'Philippines pushes hybrid rice to solve soaring food prices,' ANN, author not named, 17 April, [afp.google.com](http://afp.google.com)). But it's not enough. Irrigated rice is only half the correct equation for rice agriculture. The other half is dryland rice, which I may say is half dependent on God, for making sure the rain will fall, and half dependent on Man, for making sure to harvest that rain. Saturnina Halos says in the Philippines we have 3.1 M ha of irrigable lands but only 1.47 M ha are irrigated (Ira Karen Apanay, 09 April, [manilatimes.net](http://manilatimes.net)). Halos is an adviser of the Department of Agriculture. She tells us we have been focusing too much on irrigated rice to the neglect of 1.63 M ha of drylands. I believe her, but her data is too precise for me; I know for a fact that right in Isabela, where the Magat Dam is, the Hilarios have 7 hectares on whose headlands runs the irrigation canal and yet those 7 hectares cannot be irrigated – the water available is not enough. Asia's biggest water dam cannot supply enough water even to the ricefields close to the watershed! And that has been true since the Magat Dam was built in 1983. So, I say, be careful when you say 'irrigated ricelands.'

So, I'll simplify the data and say of the ricelands, 50% are wetlands (irrigated) and 50% are drylands. So, what has been happening in the Philippines is that when it comes to rice, 50% of rice agriculture has been trying to feed 100% of the population. Heroic, but too good to be true. In the meantime, the other 50% of ricelands has been neglected by government: the drylands. We are the Drylanders; we are equally important as the Wetlanders, if mostly Ilocanos. We demand government attention.

'Survival and resilience are the things going for dryland agriculture,' ICRISAT Communication Director Rex Navarro said. The new science institute will start with those. Then will arise new seeds of crops from scientists, new seeds of technologies appropriate for the drylands, nurtured with new seeds of initiative from the locals. ... The Dryland Revolution.

The drylands I'm referring to are those traditionally non-irrigated lowlands as well as the cultivated uplands grown to rice part of the year. Government officials and government scientists, including those of UP Los Baños, have neglected them, paying almost exclusive attention to irrigated rice.

An indication of this is that in the PJCS (Philippine Journal of Crop Science), a technical publication produced on campus at UP Los Baños, out of 833 published papers in the last 32 years, only 57 deals with rainfed rice in any significant manner; that is to say our scientists have been giving the rainfed areas their scant 7% attention. To round up the figures, let us include the upland areas and say our scientists have been giving 10% of their attention to the drylands and 90% to the wetlands. Unfair!

Speaking on behalf of Secretary of Agriculture Arthur Yap, Assistant Secretary Segfredo Serrano noted that there was a predominance of delegates from Northern Luzon, Central Luzon and Northern Mindanao. 'I understand that we have an invasion of the North,' he said. The Ilocanos laughed. By 'North,' he meant the Ilocano delegates, and he was right. In a very real sense, where the drylands are, the Ilocanos are, and vice-versa. Like attracts like. That is because the Ilocanos thrive where the conditions are harsh. Two excellent examples of this great grit of the Ilocanos were in fact present in the conference:

(1) William Dar, Director General of ICRISAT, is from Santa Maria, Ilocos Sur. He is the one who turned ICRISAT from a moribund institution to Number 1 among the 15 international CGIAR centers in only 6 years. He is an exemplary executive so much so that his term as Director General of ICRISAT has been extended up to 2015, his third 5-year term (2000, 2005, 2010). To the Clark conference, for the learning process, Dar brought with him from ICRISAT Suhas P Wani, Principal Scientist (Watersheds), who spoke on new science tools for upgrading rainfed agriculture. For their expertise and experience, from ICRISAT also came Shyam N Nigam, Principal Scientist (Breeding); M Prabhakar Reddy, Head of Farm & Engineering Services; Rex L Navarro, Director of Communication. YS Ramakrishna, Director of Central Research Institute for Dryland Agriculture (CRIDA), came with the ICRISAT group.

(2) Santiago R Obien, founding Executive Director of PhilRice is from Batac, Ilocos Norte. He transformed PhilRice from an insignificant, even redundant office into an institution of world renown in just about 10 years. At that time, IRRI was already an international star, having spawned with her Miracle Rice the Green Revolution in Asia. I told you the Ilocanos excel where you're not supposed to.

I have to make an exception with BAR Director Nicomedes P Eleazar as he is not an Ilocano. I remember the Eleazars who came to my hometown were nice, gentle people. I don't know him personally, but I have it on good authority that Eleazar is one science leader who has a kind heart for the poor farmers. It's easy to believe that. You see, the Clark conference was in fact held to lay the groundwork for the establishment of the Philippine Dryland Research Institute



(PhilDRI), with BAR and ICRISAT as co-sponsors, godfathers. The drylands are inhabited by the poor of any country; if you have no heart, you will relegate them to where they have always been – the parched lands, the boondocks.

Do we really need to institutionalize the science of dryland agriculture? One of the speakers, Rosalina G De Guzman, Supervising Weather Specialist of Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), cited the report of the UN IPCC that global warming was ‘unequivocal’ – in the American idiom, ‘a clear and present danger.’ I believe in PAGASA; I believe in the IPCC. Among other things, more droughts will occur. Drier soils, lower crop yields. We needed PhilDRI yesterday.

Of the drylands, Agriculture Assistant Secretary Serrano had this to say: ‘We were able to see in the uplands, the rainfed areas how the risks are infinitely multiplied when you don’t have control over the water.’ And as a reminder to those who tended to forget, this: ‘You want a program for dryland agriculture to succeed? The local government must be there.’ Thanks for the reminder, Sir.

BAR Director Eleazar is championing the establishment of PhilDRI and is bullish about it, I understand. He has been supportive of dryland agriculture where others have been neglectful. With his initiative and the support of ICRISAT Director General William Dar, a new institute will be born, a legacy of Secretary Arthur Yap and President Gloria Macapagal-Arroyo. Right on time. No new science institute has been created since PhilRice 21 years ago. The sower of the seeds of this one is Eleazar. We hope the seeds will fall on good soil, so that each will produce fruits a hundredfold (Luke 8: 8, New American Bible).

‘Survival and resilience are the things going for dryland agriculture,’ ICRISAT Communication Director Rex Navarro said. The new science institute will start with those. Then will arise new seeds of crops from scientists, new seeds of technologies appropriate for the drylands, nurtured with new seeds of initiative from the locals. Soon the drylands will blossom. The drylands will turn from grey to green and give rise to a new revolution in agriculture. The Dryland Revolution.

Not another Revolution?! This one should be easy. A scientific revolution. Inocencio ‘Bong’ Bolo, one of the experience-rich consultants invited to the Clark conference, was telling me it’s all very simple. If you increase the yield in 1 million hectares of dryland by a very modest 10 cavans per hectare, you have an additional 10 million cavans of rice to add to the stock in only 100 days. If you planted rice twice a year, you have 20 million cavans of rice to add to the supply for every 365 days. That is experience talking; that is ‘harnessing the potentials of millions,’ as he put it.

And how do you do that? Let me count the ways:

*We want to select a rice variety that thrives in water-starved soils. Then you can get a rich harvest from a poor soil. If we have to breed that variety to fit the site, we will, eventually.*

*We want to improve the soil so that it captures the rain and doesn't let go. And you can do that by building the organic matter content of the top layer of the soil through, I advise, Edward H Faulkner's trash farming technique.*

During the dryland conference at Clark, Director Ramakrishna of CRIDA pointed out:

*The Green Revolution in the mid-sixties, though a boon to Indian agriculture, also ushered in an era of alarming disparity between productivity of irrigated and rainfed regions.*

That is to say, in India, because of irrigation and Miracle Rice, in the lowlands the rich became richer; in the drylands, untouched by irrigation and miracle seeds, the poor remained poor. What was true of India was true of the Philippines. That is to say, Moses-like, Science parted the waters and separated the rich and the poor.

So, this time, we want to remember other crops after rice. Like pigeonpea (kadios, *Cajanus cajan*) and chickpea (garbanzo, *Cicer arietinum*), corn, peanut (groundnut), mungbean (*mungo*), sweet sorghum (sorgo, *Sorghum bicolor*). My favorite crop right now is sweet sorghum, which is good for producing food, fodder, forage, fertilizer, fuel for home, biofuel (ethanol) for cars & trucks. Sweet sorghum can be for big time, with a distillery plant costing millions of dollars, or small time, with village-based livelihoods working on the grains and sugar from the stalks. Well-earned and deserving, Big Bang for the Big Bucks and small change for the small fry – I thank the Lord for those.

And we want to be creative. Gavino Isagani P Urriza, who spoke on behalf of Director Silvino Q Tejada of the Bureau of Soils and Water Management (BSWM) was good; he did the BSWM proud. He said, 'We need a lot of innovation. We have to be creative.' And he mentioned, among others, to improve crop-livestock production, to catch the rain, to employ minimum tillage, to harvest the water.

And we want the local government units (LGUs) to be in the thick of it. With the Local Government Code of 1991 dedicated to the process of decentralization, the LGUs have the power; all they have to do is flex it. And all we have to do is remind them of it, advocate for the millions of poor families in the drylands, their own people. They should have the heart for it.

And we want the market to work in everyone's favor. Dar told the delegates at the Clark conference that 'linking farmers to markets was the best way to prosperity for farmers for Sub-Saharan Africa.' If the African can, the Ilocano can, the Filipino can.

To want is important. We want the parched lands, the boondocks to become the drylands of hope. Then we can all give thanks to the heavens!

– Published 23 April 2008 in *American Chronicle*

## THE WATER PEOPLE. MAY THEIR TRIBE INCREASE!



**M**y advice: To defeat the drought, use water. Intelligently. ICRISAT does it, why don't we? By we, I mean, the rest of the drylands of the world, the countrysides of Asia especially. News travels fast, but not always memorably. The message is the message remembered. I don't remember coming to know that 2005-2015 has been proclaimed by the UN as the 'International Decade for Action – Water for Life' (gdrc.org). I didn't know Unesco was concerned about the world's freshwater, 'a major factor in the rise and fall of civilizations' (Kofi Annan, 2003, Foreword, Water For People, Water For Life, Unesco Publishing & Berghahn Books).

Water is life, someone said, I want to repeat it, to paraphrase it: Water is problems. That is to reflect stark reality. Water is problems where there is plenty, as well as where there is petty. It's the people, dummy. So, to paraphrase it again: Water is people.

Just this 25 October, ICRISAT advocated a 'rescue plan for dryland farmers,' with Director General William Dar saying that 'there is much that governments can do to support these farmers,' the solutions to problems coming from supportive policies, infrastructure and systems, as well as access to seeds, inputs, and irrigation.

Right! But right now, I'm looking at only The Liquid Solution: Water. Access to irrigation is one way of looking at the solution. Now, this is my advice to the dryland farmers:

Access is not given – it is taken. Access is a right and, as all rights, you don't wait for it to happen – you exercise it, you reach for it. In any case, governments are notorious for lack of political will. So, take it, take it! yourself.

Based on my readings, ICRISAT has a few watery instructions for those of us who have the political will. And these are

- (1) Plant crops that scrimp on water
- (2) Harvest water
- (3) Scrimp on fertilizer to scrimp on water
- (4) Drip, not flow.

So, let us learn from Team ICRISAT, who is very good at this. They have to be. ICRISAT is based in India, and everybody knows India is so many million people in so many million hectares of dryland, the SAT they call it. Parched, akin to parchment paper. Now then, don't be surprised that in India, while the cow is beyond slaughter, the water is beyond price.

ICRISAT was set up in 1972. The Team was mandated or assigned 5 crops to work on: chickpea, groundnut (peanut), pearl millet, pigeonpea, and sorghum. So, they began their science with mission possible: create outstanding cropping systems where outstanding yields can be harvested from outstanding crops that can do away with irrigation water as much as possible. If you can't solve the problem, innovate.

## **(1) PLANT CROPS THAT SCRIMP ON WATER.**

Team ICRISAT has come up with invaluable varieties of its crops that grow well or better as is, where is. If the dryland is the given, what is the problem? The problem is the smart crop to grow given that kind of soil.

So now, ICRISAT has at least 2 smart crops: (a) The Saving Crop and (b) The Multiplier Crop. So now on the first crop, from Africa, this news from Kenya by the VoA (Voice of America) saying that:

*Pigeonpea demonstrated its superiority during a severe drought – several families we visited survived solely on pigeonpea as it was the only crop that made it in the fields.*

That pigeonpea saved those families from hunger. In other words, the VoA is saying in the Kenyan heat ICRISAT pigeonpea wrung from the soil enough moisture while the other crops wasted themselves. This pea's performance was a product of breeding, modern and traditional, the new generation borrowing from the old – so there is good yield despite bad water stress – so it was the only crop that made it to the market stalls and home plates. Breeding will get you someplace.

That's what I call The Saving Crop.

And now on the second crop, from Asia, this news from Bangladesh about this high-performing chickpea created by ICRISAT and field-tested by Bangladesh Agricultural Research Institute (BARI). You plant it after rice, and it grows well on the left-over, short-duration soil moisture – it's a short-duration variety. In the wastelands of Bangladesh, BARI reports that now this one grows where no crop grew before. In the Barind Tracts, compared to other crops after rice, this chickpea has doubled the traditional yield, doubled the area planted to the crop, and tripled the returns.

That's what I call The Multiplier Crop.

## **(2) HARVEST WATER.**

The most successful water-related story of ICRISAT that I know of is that of the Adarsha project, where at first, the experts brought the technology of water harvesting to the people who already knew about them but didn't think it would help them solve their drought problem. The villagers had lost hope. This was in the village of Kothapally in Andhra Pradesh, some 40 km from the campus of ICRISAT.

Enter technology to abet hope. Initially, it didn't work out like the experts thought it should. Eventually, the Adarsha farmers and their families appreciated the value of harvesting water in their water-challenged lives, so they became active actors in their own drama of development surrounding their own village needs. They used gabions, gully controllers, pits, bunds, earth and masonry to catch

There, microdosing of fertilizer, here microdripping of water to irrigate the crop. If you have more dry spells than water as they do in Zimbabwe, you have to learn to release the water very slowly, drip, drip, drop, and not in flows or streams.

and store water. To harvest their crops, first they had to harvest water. They worked for water, they worked for themselves.

That's what I call The Water People. May their tribe increase!

### **(3) SCRIMP ON FERTILIZER TO SCRIMP ON WATER.**

What happens if you have a good crop variety and a bad soil and you don't fertilize because you can't afford to? You harvest little. Now, ICRISAT and partners in Niger have invented a penny-pinching fertilizer formula they call 'microdosing,' whereby a beer capful of fertilizer is enough for a seed – you sow the seed and the fertilizer at the same time – and you get more from your crop and you spend less for your ammonium nitrate, only 25 kg to an acre. And since you apply only so little fertilizer, you need only so little soil water to dissolve the fertilizer. In Africa, this has given 44 to 120% increases in yields for maize, sorghum and pearl millet. A little goes a long, long way.

The partners did a 2-year study on microdosing in Niger, West Africa and found that whether you microdose at sowing time or after, you harvest more than if you don't fertilize at all. If you don't fertilize, you are a good saver of water, but a poor businessman farmer: No pain, no gain. No risk, no rise.

For each hill, you measure the fertilizer in a 3-finger pinch and apply the dose by hand. That is very low tech. But the results are high take – you put in less, you take out more.

That's what ICRISAT sees as a win-win technology because it adds to the benefits and deducts from the cost. 'The marginal value-cost ratio is greater than 3,' says Team Captain Dar, 'indicating significant profitability.' That is to say, your \$15 worth of fertilizer (for 1 ha) gives you back at least \$60 worth of harvest, or \$45 extra. And that is true for corn, sorghum and pearl millet. \$45 extra is not peanuts in Africa. Not in the Philippines either.

### **(4) DRIP, NOT FLOW.**

There, microdosing of fertilizer, here microdripping of water to irrigate the crop. If you have more dry spells than water as they do in Zimbabwe, you have to learn to release the water very slowly, drip, drip, drop, and not in flows or streams.

ICRISAT has what it calls a 'small-scale drip irrigation kit,' which is low head and low cost (Paul Belder & Co, 2007, icrisat.org). This is the garden variety, if you will pardon the expression, for small plots for a single household. A bucket, drum or barrel is elevated so that the water can flow down by gravity. It is connected to a system of pipes, laterals and emitters – every emitter takes care of a hill. As of February 2007, some 70,000 microdrip irrigation kits had been distributed in relief by the UK DFID in Zimbabwe to improve the food supply as well as add to income of households.



A caveat: Marketers beware. Those who received the drip kit from DFID not always use the kit. Freely given, not gladly taken? I take that to mean the experts here were not good marketers of innovation. Or, there was no political will on the part of the receivers.

So, here are a few more ways to be intelligent about water and defeat the drought with political will

- (5) Trap the water above
- (6) Trap the water below
- (7) Save water.

### **(5) TRAP THE WATER ABOVE.**

It is obvious that whether in the farm or in the garden, as long as there is vegetation growing, there is moisture; what is not obvious is that as much as the soil is bare, as much is the water lost by evaporation. Every gardener knows that a mulch will trap the water already at the top of the soil and keep it there.

That mulch can be built by applying compost on the field or by green manuring on-farm (GMO), that is, by plowing and incorporating into the soil any plant at the flowering stage, especially legumes.

What farmers know is that a GMO improves soil fertility, adds soil nutrients, helps control weeds, enhances soil aeration. What farmers don't know or don't realize is that the GMO, since it is organic matter, conserves the soil moisture by trapping the water molecules in the interstices of the soil particles – there is little or no evaporation of water from the soil. This GMO is the best soil mulch man has ever invented.

### **(6) TRAP THE WATER BELOW.**

I refer to capillary water coming from below the surface of the soil. This is water from the underground water table rising to the top by capillary action. I will explain capillary action in two ways:

(1) Capillary action is the opposite of gravity. Gravity says what goes up must come down; capillary action says what goes up stays up.

(2) Capillary action is the repudiation of the principle that 'Water seeks its own level.' Coming from below, capillary water seeks the upper level of the soil, and immediately leaps into the atmosphere by evaporation, unless trapped by vegetation or some other surface cover other than soil.

A surface mulch, compost, or GMO will trap that capillary water, keep it on top of the soil and not release it to the atmosphere. This trapped water thus becomes rich with the soil nutrients coming from the mulch, compost or decomposing green manure.

## **(7) SAVE WATER.**

And that brings us back to the drylands and the 5 mandate crops of ICRISAT – by their very nature, they remind us to conserve water. Conserved water is life. Wasted water is problems.

Actually, the watery problem is not a problem of farmers alone. The problem is water use and abuse at home, at the office, on farm, in the factories.

To defeat drought, we must use water intelligently. To use water intelligently, we must use political will. Now, we have the intellectual muscle; do we have the political will?

We can all be The Water People and if so, may our tribe increase! For our scientists, they must put theory into practice. For us laymen, we must put political will into practice. For all of us, it is important to remind ourselves: Political will does not begin with the leader – it begins with me, with you, with US.

*– Published 10 November 2008 in American Chronicle*

## WHERE'S THE WATER? NASA, WHERE'S THE LIFE?



**N**ASA of the US: We have found 'evidence of a wetter Mars' (28 October 2008, [upi.com](http://upi.com)). Drylands of the world: We don't want evidence of the existence of water once upon a time; we want the water now! On second thought, we can learn from what the National Aeronautics and Space Administration (NASA) has learned.

NASA: 'Water most likely flowed in the distant past on Mars, carving channels and other features clearly visible on its surface. But other than in the form of clouds and ice, liquid water cannot exist on the planet's surface today, thanks to the thinness of its atmosphere' (2000, Andrew Bridges, space.com). Franciscan: As far as I'm concerned, Mars is dead.

In last month's report, NASA had observed hydrated silica, or opal, 'spread across large regions of Mars. That, scientists said, suggests liquid water was on the planet's surface as recently as 2 billion years ago' (upi.com).

I said dead. Water was there 2 billion years ago. Not today. The fate of Planet Mars is going to be the fate of Planet Earth if we don't watch where the water is going! And if the atmosphere in Planet Earth remains hostile to any life form other than our own egoistic selves.

From the science of exploring the universe out there, let us turn to the science of understanding this world right here. On 3 November 2008, in a scientific meeting at Istanbul, Turkey, in his Introductory Statement as Chair of the Committee on Science and Technology of the UNCCD, William Dar says:

We must continually remind ourselves of how important our task is. We live on a precious planet that hosts abundant, diverse and intelligent life that is unique in the universe. If we fail, the consequences are disastrous. We must use science to become better stewards of our precious inheritance.

Dar is Director General of ICRISAT. The CST is meeting 3-14 November at Istanbul in its First Special Session.

Here, I am going to reduce that 'precious inheritance' Dar is talking about to only one thing: Water. NASA, if you're looking for intelligent life, you might as well start with Planet Earth.

UN Secretary General Kofi Annan says on 22 March 2005 in a video message: 'We need to increase water efficiency, especially in agriculture.' In agriculture, from high school 50 years ago, I came to know we are The Water Wasters.

Since my dear Philippines is agricultural and remains largely non-industrial, I'm interested in the science of crops; and since I'm an Ilocano and can trace my roots from the North (Rosario, La Union), I'm interested in the drylands. And since I'm a science writer, I'm interested in how the drylands can become more fertile and productive. Water is a good start. How can we be intelligent with water?

Be careful when you say 'water efficiency' – for instance, if you say 'irrigation facilities for rice improved water efficiency in Central Luzon,' that is misleading, to say the least; what you really mean is that the facilities improved water availability. Water facilities don't improve efficiency by themselves – it's the rice farmers who use water who do. Or not.

Reasoning out the Mars probes, NASA asked in 1998 (mars.jpl.nasa.gov): 'What caused the change in Mars' climate? Were the conditions necessary for life to

originate ever present on Mars? Could there be bacteria in the subsurface alive today? These are the questions that lead us to explore Mars.' In the last part of that paragraph, NASA asked, 'What are the minimal conditions necessary for the formation of life?'

Minimal conditions: Plural in number. NASA did not have to go to Mars and spend billions of dollars of American taxpayers' money to answer that question. I could have rephrased that question into the singular and asked, 'What is the minimal condition necessary for the formation of life, and the continuance of it?' And I could have answered with only one simple word: 'Water.' You can have all the minerals in the world, as probably Mars has, but if you don't have water, you don't have life. 'Where's the water in Mars?' is not the question; 'Where's the water?' is the question.

Alternatively I could have opened my New Revised Standard Version Bible to NASA and showed them Genesis 1:1-2 that speaks of when God created the universe:

*In the beginning when God created the heavens and the Earth, the Earth was a formless void and darkness covered the face of the deep, while a mighty wind swept over the face of the waters.*

Whether in Evolution or in Intelligent Design, water was there at the beginning. I'm a Roman Catholic and I believe my NRSV. On the sixth day, God created Man, that is, He created water first. Water was right there in the very beginning. It's not the economy, even science will tell you it's the water that gives you life.

Even the ancient Egyptians will tell you. Why were the pyramids built dry? Why are the mummies dry? The Pharaohs didn't want their bodies to waste away. It's the water that gives life to the fungi and bacteria and worms of decay.

NASA, if you were looking for signs of life, you didn't have to go out of this world.

But, NASA, if you were looking for signs of intelligent life, you would have had a problem there. Up to now, we humans have not shown much intelligence when it comes to, say, water. Because we don't recognize it as the continuing

In the 10-year UNCCD plan itself ([unccd.int/cop](http://unccd.int/cop)), I find that (Operational) Outcome 3.5 interests me greatly: Effective knowledge-sharing systems, including traditional knowledge, are in place at the global, regional subregional and national levels to support policymakers and end-users, including through the identification and sharing of best practices and success stories.

source of our continuing life, we treat it as just another resource that we can be prodigal with.

In 2003, Unesco came up with *Water for People, Water for Life* (subtitle: *The United Nations World Water Development Report*), where the main & introductory illustration for Chapter 1, 'The World's Water Crisis,' is a young black girl who is a seller of wares, who carries on her head plastic containers of all kinds. Illustrations are very, very important to me in the sense of Marshall McLuhan's 'the medium is the message,' that's why I now take my own photographs; and the silent message I get from the Unesco image is that 'the container is the thing' and not the substance abuse or misuse. Caveat communicator!

In that Introductory Statement I have cited, Chair of the CST William Dar also says, 'The new 10-Year Strategic Plan and Framework to Enhance the Implementation of the Convention is our roadmap for change.' Change we must all believe in. Of that plan, he quotes the COP (Conference of Parties) for the UNCCD as saying that 'Operational Objective 3 on science, technology and knowledge is a central component of the strategic plan. The CST is given primary responsibility to fulfill this objective.' The COP is the supreme governing body of the UNCCD. The UNCCD has newly adopted the results-based management (RBM) approach in its operations, so it's interested in outcomes. According to C Buentjen of the ADB ([adb.org](http://adb.org)), RBM is 40 years old and this approach came from the private sector. The UNCCD came to life 17 June 1994 ([unccd.int](http://unccd.int)); the news tells us at least the 44-year old UNCCD is not averse to change.

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*Effective knowledge-sharing systems, including traditional knowledge, are in place at the global, regional subregional and national levels to support policymakers and end-users, including through the identification and sharing of best practices and success stories.*

Expected result: Scientific knowledge shared. I could write a book about how as matters stand today in the Internet world, not to mention the print world, in science much of the knowledge open for sharing do not because they cannot support policymakers and end-users – for the simple reason that they are written in technical language that only the scientists themselves understand. Hardly any policymaker or end-user of knowledge speaks the language that scientists and their advocates prefer in their publications and webpages, websites. Science must translate itself to Everyman's language if it doesn't want to remain irrelevant. Now therefore, Team CST has its job cut out for it.

By now, the way I look at it, having been Team Captain of ICRISAT for the last 8 years, William Dar is in his element: Water. Simple. ICRISAT has twice been rated Outstanding by the World Bank among 15 international research centers allied under the CGIAR; the 2 ICRISAT Rated O awards were for Total-System or Team performances in 2006 and 2007. You will note that ICRISAT works in



the semi-arid tropics, and it is based in India, a big water-challenged country – all that means that its 5 mandate crops must not only survive but improve with very little water in the soil. That's one of the reasons Team ICRISAT calls its new, improved varieties smart crops.

William Dar is an Ilocano, from Santa Maria, Ilocos Sur, from the drylands of the Ilocos Region, Northern Philippines, so he knows the value of water, or lack of it. ICRISAT has regional offices in Africa, projects also in Asia. In the drylands of Africa and Asia, of course they know the value of water, which is like that of a pearl of great price – people usually value what they lack. Those who have, do they know how to make the best use of water? A few. It is the vast majority, the multitude who must learn the many ways to use even inadequate water intelligently.

In his remarks I have already cited, Dar mentions one of the welcome news in the science of water: The formation of the Dryland Science for Development (DSD) consortium composed of five international institutions of renown: the European DesertNet, ICARDA, the Joint Research Centre/Institute for Environment and Sustainability of the European Commission (JRC/IES), the United Nations' University's International Network on Water, Environment and Health (UNU-INWEH), and ICRISAT. Dryland science for development? Actually, the DSD is the working team of the CST in preparing and raising funds for the 1st scientific conference on drylands to be held at the end of 2009. On Earth, not on Mars.

All that, of course, proceeds from the premise that, Dar says, 'science has a critical role to play in the sustainability of the world we live in, and the quality of life that we enjoy.' He qualifies that and says, 'The critical challenge before us today is to improve the interface between science and policy so that the right steps are taken that will bring us back from the edge of the abyss.'

Interface?

'The world is watching us,' Dar says. I hope not. I hope the world is not just watching. We have too many watchers and too few doers.

'The world is watching us, and will judge us by the decisions and actions that we take here in Istanbul.' That's the problem with the world, always watching others and judging them. Just watching. When will the world stop watching and start taking action for the good?

'Our planet is not ours to destroy,' Dar says. 'We hold it in trust for future generations. Will we live up to that trust?'

The interface of science and political will. Science will do its part, I have no doubt about that. I'm not so sure about political will.

– Published 17 November 2008 in American Chronicle



**THE LITTLE PEOPLE.  
CREATIVE CAPITALISM NEEDS  
RISK TAKERS IN SCIENCE**



If you were a Wall Street investor and a loser, what you had was paper money. Now the paper has run out; now you're left holding the bag, no paper. You invested your future on a piece of paper, and now all you have is the future. Wall Street has always been high risk, as high as the Trump Building at 40 Wall Street between William and Broad Streets - 282 meters, 72 floors. Wall Street is speculative, not Creative Capitalism.



Now, it's time to invest more on the little people. Compared to Wall Street, the little people are hardly a risk. They are the greater number anyway, the multitude, remember? Out of the sweat of their brow we have been enjoying our food, clothing, shelter, and medicine, not to mention our luxuries. The little people are the creative workers. Take the creative risk, if not Christian risk, and you'll be glad you did. Didn't Jesus say? 'Just as you did it to one of the least of my brothers, you did it to me.' Matthew 25:40 NRSV

I imagine that's what Bill Gates was saying when he announced his theory & practice of 'Creative Capitalism'. That's going against conventional wisdom. Creative Capitalism is truly spreading the wealth to include those who have none, not concentrating it in Wall Street to people who already have everything. In other words, Bill Gates, bless his soul, was calling for New Risk Takers.

So, aside from Bill Gates, is anyone else interested in taking the risk with the little people? Alas, we have so few great historical examples in the last 100 years:

*In California, yes, in 1906, when the Great Quake flattened rich and poor alike.  
In Bangladesh, yes, in 1976, when economic theory said the practice was crazy.  
In India, yes, today, while the US continues to think rich even in science.*

On 18 April 1906, the Great San Francisco Quake reduced much of the city to debris. He knew exactly what to do. Amadeo Peter 'AP' Giannini sifted through the ruins of his bank, the Bank of Italy, loaded his wagon with some \$2 million in gold, coins & securities, and went back home (Daniel Kadlec, 1998, time.com). Was he stealing it? He was stealing time. AP didn't wait for the other banks planning to open in 1 month; in 6 days, he set up his new 'bank,' which was a wooden plank set on top of 2 barrels, and proceeded to extend loans 'on a face and a signature' to small businesses and small people to help them rebuild less their business and more their lives. He was banking on the little people.

He didn't apply the old banker's rule that I will lend you money only if you can show me you have money. In other words, he was not lending money; instead, he was giving out hope. Was his trust in the working class misguided? It wasn't. AP's bank grew and extended beyond San Francisco, had branches from coast to coast, and eventually became the Bank of America, which he had made into the largest bank in America at the time of his death in 1949. (It's #2 today, behind Citigroup, \$572 B vs \$751 B.) AP is the only banker to make TIME Magazine's 'Builders & Titans of the 20th Century.' He is my Working Class Hero!

Not only that. AP was not averse to risk when it came to the poor, but he was averse to riches. He is my Working Glass Hero! "I don't want to be rich,' he said. 'No man actually owns a fortune; it owns him' (quoted by ANN, 2008, entrepreneur.com). Personally, I have always been averse to the risk of rich.

AP also said, 'I have worked without thinking of myself. This (is) the largest factor in whatever success I have attained' (quoted by ANN as cited). One in a million soul.

In Bangladesh, another fellow, another rare hero has been working without thinking of himself. He is Muhammad Yunus.

In the mid-1970s, forgetting modern economics, Yunus wasn't thinking of maximum profit at minimum service; he was thinking of maximum service at minimum profit. He was thinking small; he was thinking little people. He was a Professor at the Chittagong University in Bangladesh lecturing on economic theory when one day he decided to put into practice what he was not preaching: Lending money to those who had no visible means of paying it back. That is foolish. No, that is faith, 'the evidence of things not seen, the substance of things hoped for' (Hebrews 11:1 KJV).

How small was it when Grameen started? \$27 loaned out to 42 people, that is, it came to a little more than 60 cents to a borrower (Evaristus Mainsah et al. 2004, web.mit.edu). How small can you get? But Yunus had faith bigger than his heart; and the village borrowers of Bangladesh had hearts bigger than their heads – all of them surprised the economics professor by paying him back! That's gratitude. From the little people.

That started the Grameen Bank, which was formally set up in 1983. 'Grameen' from 'gram' or village; Grameen was for the villagers, not the villagers' leeches, the usurers. (We call them 5-6 in the Philippines, the 20 percenters, who collect everyday.) With Grameen, social pressure kept everyone honest. Twenty three years later, Muhammad Yunus and the Grameen Bank won the Nobel Peace Prize for 2006.

'All people,' Yunus told the graduates of MIT 6 June 2008, 'are packed with unlimited potential' (and carry) 'a wonderful gift inside them. ... Our challenge is to help unwrap their gift' (David Chandler, web.mit.edu). He was asking the MIT graduates to create a new kind of businessman, a society-minded type. 'You can change the world,' he said. As he had. 'When many little people take many little steps in many little places, they can change the world!' – Barbara Rutting.

Today, microcredit is a multi-billion dollar industry in many countries. Now, what Grameen and its many copycats worldwide call microcredit, I prefer to call little people-credit. Give credit to whom credit is due, people! It's the little people that

I believe Team ICRISAT and partners will do well also to map out a parallel strategy, what I shall refer to here as 'The Village-Friendly Initiative.' The basis of Village-Friendly is the well-known mantra: 'Think globally, act locally.'

make it work, not the size of their credit. These are 'minute sums, borrowed mainly by illiterate women, to set up the smallest imaginable enterprises' and the success of Grameen illustrates the 'bankability of the unbankable' (Rosemary Righter, London Times, 31 October 1998). Grameen grants to women 95% of the loans (Mainsah et al. as cited, 2004). Is this the bankability of women? Maybe. Rather, I think it's community. It's village. It's the bankability of little people who don't theorize but practice. In India, members of Team ICRISAT both theorize and practice for the poor.

ICRISAT is creative for a science agency. Among this NPO's many initiatives is what it calls the Agri-Business Incubator (ABI), which it has set up in its campus in Patancheru. Another winner. The ABI received the AABI Incubator of the Year Award for 2008 last 29 October in Seoul, Korea. The AABI is the Asian Association of Business Incubators; that was their 13th General Assembly meeting. Not many people recognize a winner when they see one.

ABI is not unlike Grameen, as it is also pro-poor and a risk taker. But this one is bigger business. This is essentially where capitalists meet the poor and with the support of the Government of India, donors and with ICRISAT technology, they incubate an entrepreneurial egg until it hatches and grows into a hen that lays all those proverbial golden eggs.

My favorite example of an ABI product is the sweet sorghum facility of Rusni Distilleries in the Medak district of Andhra Pradesh, which is now producing 40 kL of ethanol every day from sweet sorghum and other feedstocks. Harvesting and processing the stalks provides about 40,000 man-days of labor per year at Rusni. Last year, 540 ha were planted to sweet sorghum and involved 791 farmers in Andhra Pradesh. A great beginning of a great industry.

Team ICRISAT is dead serious about sweet sorghum, and so am I. And now the Team is developing a 5-year sweet sorghum R&D strategy. To help the fledgling sweet sorghum industry to develop, as far as I can discern from the senior staff discussions, with partners outside of ICRISAT, the Team plans to mainly:

- (1) Map out zones for cropping in Asia & Africa
- (2) Breed sweet sorghum with higher & higher yields
- (3) Improve cane processing to reduce losses after harvest
- (4) Test syrup-making at the village level
- (5) Test a 50-mile radius for farmers supplying cane to distilleries.

Those are the bare-bones essentials of the plan. I think it's a good one.

So, while members of Team ICRISAT work out the details of their new strategy to breed and select outstanding sweet sorghum varieties and help the farmers get the most from their labors, I believe Team ICRISAT and partners will do well also to map out a parallel strategy, what I shall refer to here as 'The Village-Friendly Initiative.' The basis of Village-Friendly is the well-known mantra: 'Think globally, act locally.'



I remember last year, Team Captain William Dar and I were talking about the national rice trials that have been conducted in the Philippines probably for the last 50 years. Researchers test-plant promising rice hybrids in many locations, gather the data, and compute for the consistent highest yielder in all locations, select that and recommend it to everyone, and deselect the rest. That's thinking global. We agreed that this needed a paradigm shift. A change we can all believe in. Crops are always location-specific; they perform best where they will, not everywhere. Plant breeders can telescope time if they compute for the highest yielder in each location instead and recommend that for that location. That's acting local.

That is to say, you prescribe on-site what you have pre-tested on-site. For example: If you test-planted 26 varieties of sweet sorghum (SS1 to SS26) in 52 villages (V1 to V52) in 52 provinces in the Philippines, you will find, for instance, that SS1 is best in V15 and V36, SS13 in V2 only, SS18 in V25, V37, V38, V45, V51 and so on and so forth. So you recommend SS1 for V15 and V36 only, SS13 for V2 only, and SS18 for V25, V37, V38, V45, V51 only, because these are the village-specific, village-friendly varieties. In 1 year, you see, you have 26 outstanding varieties planted where they perform their level best. Max.

Applying that proposition, from out of the available sweet sorghum varieties and hybrids of ICRISAT, the highest yielders can be selected from those test-planted in the villages. (For Ilocos Norte, Northern Philippines, you can ask VP for Planning & External Linkages Heraldo Layaoen of the Mariano Marcos State University; he has an ICRISAT-funded project on sweet sorghum, and he has been making trial plantings of several varieties for several years now.)

After that, you worry about processing and marketing. You always have to worry about processing and marketing, especially marketing. That's where the little people usually get the littlest of the benefits from the sweat of their brows.

Meanwhile, the 2007 data from ICRISAT-Rusni experience at Andhra Pradesh indicate that, 'by and large, the crop performance was satisfactory under good soil and rainfall conditions and where the farmers adopted the recommended crop management practices,' Captain of Team ICRISAT William Dar tells us. 'We have data indicating greater scope for increased yields under farmers' conditions, provided they manage their crops well and the rainfall is good.'

Noted. Yes, they have some familiar but unconquered territory to explore. This year, the best yield in scientists' farms is 50% higher than the yield in farmers' farms. That is to say, since ICRISAT scientists harvest 50 tons max while farmers harvest only 25 tons max, you have a yield gap between lab and field of 25 tons of green stalk yield per hectare. In this case, practice is 50% of theory. How do you improve that?

Not only that; based on the above info and data, the sweet sorghum Indian farmers who got 25 tons max did so given the following conditions:

- (a) Good soil
- (b) Good rainfall
- (c) Farmers following experts' recommendations.

(a) Black is beautiful even in soils – they are more fertile. (b) Enough rains, because there is no irrigation facility. (c) The farmers have to follow recommendations in terms of crop care. The fact that many of them don't is, again, as I see it, the question of not being able to 'sell new knowledge,' a question not merely of transfer of technology but of diffusion of technology. Upstream or downstream? The farmers have much to learn, and so do the scientists.

I believe the three givens are all crucial. I also believe that the 2nd is the most crucial of all. This is so because the farmers can always build a good soil on their own whenever they decide to; they can always follow the experts' advice anytime they wish; but the farmers can not control the rain even if they want to.

Or can they?

They can, actually, if they want to. Team ICRISAT's research findings tell us how. When the rain comes, harvest the water – and you control the rain. The experience of the poor farmers of Adarsha tells us that you have to invest in the water, in this instance the rain.

So I hope that some new NPO partners of Team ICRISAT will be taking newer and more risks investing in water. I hope that in the ABI at ICRISAT campus in Patancheru, they can convince (or convene) another village-friendly bank to invest in poor sweet sorghum farmers who own only their faces and their signatures and need to invest their energies in water for their farms and homes in the villages. Liquid Green Grameen, I shall call it. When they succeed, and I have no doubt they will, like the Grameen Bank of Muhammad Yunus, Liquid Green Grameen will become a model for many a developing country in Asia and Africa. Even if they don't win a Nobel Prize for Peace, they will have already won the hearts of the little people who number in the billions.

*– Published 27 November 2008 in American Chronicle*

**SCIENCE GROUNDED.  
1 WORM OF MANY GUISES  
UNMASKED & CRUSHED**



**T**he science of global warming? I'm worried about the heat of this much polluted Earth. The science of dryland farming? I'm worried about the heat of this much exploited soil. But I'm more worried about the scientific method of solving either problem. Quiet, but too slow. Zealous, but too methodical. No risk-taking at all. Jesus Christ, no leap of faith!

Grounded science. I believe science should be grounded more on practice and less on theory – we don't have much time. And with the financial crisis, we don't have much funds either.

As I write this in Manila, 3 November 2008, there are two meetings going on in Istanbul in Turkey: (1) the First Special Session of the Committee on Science and Technology (1st CST) and the Seventh Session of the Committee for the Review of the Implementation of the Convention (7th CRIC), both of the UNCCD. The fight against desertification should be in Africa, Asia, even the Americas. ICRISAT Director General William Dar is the Chair of the CST, and so he is in the thick of this.

Is it urgent? Yes, as the UNCCD defines desertification as 'land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.' Dar says, 'The world is only now waking up to a realization of how it is seriously imperiling its own existence through its actions that degrade land, water and the climate.'

Degraded lands. Such areas would include parts of Africa, Asia and the Americas, the harm naturally resulting from our climate and unnaturally resulting from us primates not being good stewards of the Earth.

Dar says, 'The UNCCD focuses on the degradation of land, which is the basis of our food chain and our climate, and of the livelihoods of our poorest peoples. Without healthy lands, people cannot thrive. Without a healthy atmosphere, our land and biological systems cannot be sustained.'

Land degradation can be in the form of eroded soils, hills with little left of original vegetation, mountains decimated of wildlife, farmlands devoid of fish, frogs, crickets and earthworms, not to mention long-legged white herons. We do not understand that when we degrade the land, we degrade ourselves.

Land degradation can also result from too much spraying of chemicals to defeat the pests, who as of the latest news have repulsed any advances by the enemy (US) and refuse to be defeated. The pea-brained insects know more about the Art of War than the big-brained humans do? They are challenging our science!

Take the case of the larva of the moth *Helicoverpa zea*. This is the most ridiculous pest of them all – also the most dangerous. When this worm feeds on cotton, it is called the cotton bollworm; when this same worm feeds on corn, it becomes the corn earworm; when this same worm feeds on tomato, it transforms into the tomato fruitworm (Wikipedia). And when this same worm feeds on pigeonpea, you have a podborer. One pest four times dangerous.

This also means that the population of this worm cannot easily be decimated by man, as it can easily reproduce its own kind since it has 4 choices for its food. I believe they call that multiphagous, a glutton.

Pigeonpea, a grain legume, is a major source of protein (20%), fodder and fuel in the tropics and subtropics. So this crop is very important to the farmers, especially in India. So the farmers guard it with their wallets – they spend for expensive pesticides. By 1993, 100% of pigeonpea farmers in India were using pesticides. It worked, for a while, and as the cost of spraying began to increase, the yields began to decrease. The pesticides were no longer protecting the crop, that is to say, the insects had learned to protect themselves.

ICRISAT tells us the world of pigeonpea loses US\$ 310 million yearly in crop damage to this pest. In fact, sometime in the mid-1990s, in the village of Hamsanapalli in the Mahabubnagar district of Andhra Pradesh, farmers were losing 20 to 100% of their pigeonpea crops to this pest – despite their 3-6 sprayings of deadly, expensive chemicals (ICRISAT Annual Report for 2000). The damage to their pockets along with the damage to their crops was driving the farmers to despair. And so they sought help elsewhere, and they found it. They learned of 80-year old Mr Bitchappa.

We are told of the little-big story of how the infamous *Helicoverpa* met the unheralded Mr Bitchappa – and of course the bad guy lost. Mr B gently shook the worms off the pigeonpea plants onto a sheet which somebody else dragged along in between the rows. Of course, quite a few hens were following the sheet, and the hungry birds happily picked on the plump worms for their moveable feast. Mr B showed everyone who cared to watch how to kill two birds with one stone, if you will pardon the expression: you avoid the expensive pesticide and you raise chickens with good meat – the worms are high in protein. And what did you do? Your intervention is simply helping along the natural cycle of life and death.

Nevertheless, with that little demonstration, Mr B convinced only himself. 'Private agencies were skeptical,' says the ICRISAT Report, 'about the applicability, efficiency, and economics of (it).' Experts are always skeptical. So? In 1998-1999, they investigated the science of Mr B in some 15 ha at ICRISAT in Patancheru, supported by IFAD and collaborated with by ICAR, ANGRAU, MAU and NGOs under the coordination of CWS. So many skeptics.

The drylands are not a given; rather, they are the problem. I would like science to be grounded on the practice of solving problems, not simply theorizing about how to solve them eventually. Theories don't crush canes – not even worms.

What happened was that the science of Mr B proved to be 50% less expensive than the chemical spray, and per hectare, 7 people went home happy collecting their wages after collecting the worms. Not only that: The harvest was better, and there was no pesticide residue on the peas, and no pollution in the soil and air either. The science of Mr B was perfect.

Within two years, the science of Mr B was being practiced in more than 100 villages by several thousand farmers in three states of South India. The good news spreads.

I can imagine Mr B shaking the peas and the worms dropping into the mouths of birds – solving one problem and solving yet another – essentially, that was what ICRISAT group tested and, essentially, the nature of what they did was what I would like to call grounded science, that is to say, science begins with practice so you get more results sooner and you need so much less experimenting.

I'm bored with science that begins with a problem and instead of solving it, first tries to theorize about it, collects some preliminary information, fashions some experiments, gathers and analyzes the data, makes a conclusion, and submits a paper for publication. Everyone then hopes that such science will result in knowledge that can be applied later. I want science that begins with practice and ends up with wider practice, as in the case of the science of Mr B.

Grounding science with practice first, coming up with a theory for a wider application later – that is a leap of faith I would like to see scientists take here or abroad.

Mr B's science grounded on practice takes care of pest control. To move ahead with my theory of grounded science, let me continue with the pesticide-free, plump pigeonpeas that Mrs B brings to the market. Now, I expect some other scientists to study the marketing of pigeonpea and see how Mr & Mrs B can be rewarded appropriately and not the traders disproportionately. A study of market forces cannot simply be undertaken just to explain those market forces, as if they were worth only some percentage points for staff promotion when they are published. I want my science grounded on benefits giving off added benefits.

We must also ground policy on grounded science. 'The critical challenge before us today is,' Dar says, 'to improve the interface between science and policy so that the right steps are taken that will bring us back from the edge of the abyss.'

There's a proposal for President Gloria Macapagal-Arroyo to set up PhilDRI. I'm all for it, as much as it is grounded science. And yes, I expect north dryland science grounded on folk wisdom, that is, Ilocano folk wisdom. Those people in the Ilocos Region, they have been dealing with drylands all their lives they have it in their database – their head. Practice first, theory later.

Grounded science is, for example, village-scale growing of ICRISAT sweet sorghum varieties in Bugnay, Ilocos Norte and crushing the canes for jaggery,



basi (Ilocano fine wine), sweets, etc, under the supervision of MMSU Professor Heraldo Layaoen, with funding and material support from ICRISAT, BAR, DA, and CHED.

I expect grounded science to be neither top-down nor bottom-up but lateral – creatively making use of Edward de Bono’s concept of lateral thinking. Life is not simply a series but a network of relationships, horizontal. Science should discover those relationships we know nothing about.

The drylands are not a given; rather, they are the problem. I would like science to be grounded on the practice of solving problems, not simply theorizing about how to solve them eventually. Theories don’t crush canes – not even worms.

*– Published 3 November 2008 in American Chronicle*







**SCIENCE 4-WAY TEST.  
IF IT TESTS GOOD,  
I MUST BE IN THE DRYLANDS**



**2**000. The Alien first came into that State during the year of The Drought and before The Great Flood; it was a brutal drought; it was going to be a ruthless flood – and the Alien asked the people to take him to their Leader. The Leader, called Chief Minister, lost no time in asking for help, big help. Crops were withering because of lack of water; cattle and goats were dying because of lack of feed. It was the worst drought in 100 years (wsws.org). 'I want to use your services in a big way for total transformation of the entire State,' the Leader said. 'We need you to help develop a future for us.' What is the future in a drought for 275,000 sq km?

The Alien was William Dar, Filipino, the new Director General of ICRISAT; the Leader was Chief Minister Chandrababu Naidu of Andhra Pradesh, India. ICRISAT was based in that State, in Patancheru. ICRISAT was paying due respects. The devastation of the drought in India had been in the news for days. This had adversely affected tens of millions in that State.

Drought is grey, ashen, bleak. Yet from out of the drought came a fresh resolve of 28-year-old ICRISAT with a new manager to advance dryland science to wage a 'Grey-to-Green Revolution' in India as well as the rest of the semi-arid tropics, the drylands of the world. The Green Revolution in the last century was for increasing yields; the Grey-to-Green Revolution in this century is for increasing hope – by increasing options, increasing water supplies, increasing skills, increasing crops, increasing incomes by decreasing costs.

'Watersheds, water harvesting, IPM, productivity increases, training,' the Chief Minister had said. 'We are interested in all aspects (of development).' The Chief Minister knew his science. He went on and proposed, 'Let's monitor our progress year by year using a scientific approach, measuring changes in water tables, pesticide usage, and other milestones.' The Chief Minister must know goals must be SMART: Specific, Measurable, Achievable, Relevant, Time-Bound. He was astute.

Monitoring: If you are improving watersheds, there must be a rise in the water table underground. If you are improving water harvesting, there must be enough water to irrigate the crops even during the dry season.

By 'IPM,' the Chief Minister was referring to integrated pest management, wherein farming care is taken in the cycle from seed back to seed so that, ideally, a balance of biological populations can occur naturally and prevent the occurrence of and damage by pests such as insects and diseases – and will not necessitate the application of toxic chemicals. After doing some good agricultural practices, let Mother Nature do her own natural checks and balances on pest vs predator populations. The pests are crop enemies; the predators are farmer friends.

With IPM, ideally, no pesticide at all is used. If you are improving on the use of IPM, there should be a decrease in pesticide purchases. Often, it is practical to monitor the progress of science by measuring the net effect (such as sales of pesticides), rather than observing the process (individual sprayings).

And where were the Director General and the Chief Minister? They were in Andhra Pradesh, historically with 'poor farming communities in harsh and unyielding environments,' as Dar described it. He also said:

*As if semi-arid environments were not punishing in themselves, we find that poorest of the poor are concentrated in the drylands. It is a vicious circle – dryland denizens are poor because their land is poor, and the land becomes poorer from continuous degradation and over-farming, making the poor even poorer.*

Was the Chief Minister asking too much?

Three decades later. Now, how can we monitor the progress of science as practiced by the Institute for the last 35 years? I have been reading their book, ICRISAT at 35: Triumphant Journey with the Poor in the Drylands.

Triumphant journey: How triumphant?

To present the accomplishments of the Institute, the book itself is divided into 4 areas to which have been assigned quite a few milestones or landmarks, as it were:

- Innovations – such as hybrids, cropping systems, watershed management
- Information – such as high tech access for low-tech/high-tech problems
- Institutions – such as agri-business incubation, agro-ecotourism
- Impact – such as higher water tables, improved incomes.

You can also look at the 35 years of accomplishments of ICRISAT according to the 4-point mandate given the Institute by the CGIAR, remembering that the Institute is the world center for selected crops in the drylands of Asia and Africa. Here's my summary of the mandate:

- Assist in developing and espousing appropriate technical & institutional changes for development;
- Increase yield & food value of these 5 crops: sorghum, pearl millet, pigeonpea, chickpea and peanut (groundnut);
- Develop farming systems by which people can make better use of natural resources such as soil, rain, watershed; and
- Advocate for national and regional crop research as well as assist in information exchanges and knowledge management.

(That just happens to be AIDA: Assist, Increase, Develop, Advocate. They are broadly in parallel with the AIDA of technology diffusion or transfer: Awareness, Interest, Desire, Action.)

In other words, if you are in the drylands of Asia or Africa and your country or village has problems with the production of sorghum, pearl millet, pigeonpea, chickpea or peanut, you can look to ICRISAT for help.

From what I have read of the ICRISAT book, and based on my research elsewhere, if I may put it this way, Science as theorized and practiced by ICRISAT can be summarized into 4 parts: Product, Process, Profits, People.

'Farming systems' includes cropping patterns, varieties planted, fertilizers, techniques of cultivation, soil and water management, tools, implements, including energy sources (man, machine, animal). That includes agricultural practices that may be advisable or not advisable.

So far, those actively assisted one way or the other by ICRISAT include the following 42 African, Asian, Middle East and Latin American countries:

*Australia, Bangladesh, Brazil, Burkina Faso, Burundi, China (People's Republic), Dominican Republic, East Timor (Timor-Leste), El Salvador, Eritrea, Ethiopia, Ghana, India, Kenya, Malawi, Mali, Mexico, Mozambique, Myanmar, Nepal, Nicaragua, Niger, Nigeria, Pakistan, the Philippines, Rwanda, Saudi Arabia, Senegal, Somalia, South Africa, Sri Lanka, Sudan, Syria, Tanzania, Thailand, Uganda, Venezuela, Vietnam, West Africa, Yemen, Zambia, and Zimbabwe.*

In his keynote address during the 30th anniversary of ICRISAT, Indian President APJ Abdul Kalam asked ICRISAT 'to (generate) possible agricultural technologies and water conservation technologies in such areas, keeping in mind that solutions to these problems may be beyond the scope of only agriculture and may need to extend to animal husbandry, poultry and agro-processing, and other related activities.' I can see that the President is a scholar of science himself.

Thirty years. From what I have read of the ICRISAT book, and based on my research elsewhere, if I may put it this way, Science as theorized and practiced by ICRISAT can be summarized into 4 parts: Product, Process, Profits, People.

Please note that by definition in the American Heritage Dictionary, profits refers not only to income but also advantages, benefits, takings, proceeds. Also, keep in mind that the 4 instructions always go together, as they make up one whole. The 4 parts must be seen to work together for the common good. Alternatively, they can also be seen as 4 concentric circles, with one area of convergence, the common center, being the good that people deserve. The convergence shows that the whole is greater than the sum of its parts.

Inspired further, I can see that the 4 elements that ICRISAT works with can be used to write up what I shall call The 4-Way Test of Science:

*How is the product improved?*

*How is the process optimized?*

*How are the profits distributed?*

*How are the people encouraged?*

## **IMPROVING THE PRODUCE**

Improving the farm produce requires beginning with improved varieties. Thus, for instance, working with the Indian Council for Agricultural Research (ICAR) alone, ICRISAT has released 13 new varieties of chickpea, 5 of pigeonpea, and 6 of peanut.



Improving the produce includes the when. For instance, in East Africa, at 90 days from sowing, they harvest the new pigeonpea when no other crops are growing; this is their food insurance.

Improving includes trial plantings. With the first Guinea-race sorghum hybrids in West Africa, the best varieties out-yielded the check varieties in research station trials – despite the rains ending 30 days earlier than in previous years.

The product of ICRISAT science can be good for the table as well as good for the soil. In 1997, the new ICRISAT pigeonpeas were tested for the first time in Yunnan Province, China. Today, the Chinese use pigeonpea as animal food (fodder), which provides high protein (20-22%), as well as for controlling soil erosion and rehabilitating eroded soils. From out of discoveries, new discoveries. Science improving on science.

## **OPTIMIZING THE PROCESS**

The Adarsha phenomenon, I call it. ICRISAT calls it ‘Innovative Farmer Participatory Integrated Watershed Management Model.’ It was developed by the Institute along with its national agricultural research system partners in 3 countries: India, Thailand, Vietnam. This is a watershed project where villagers and experts combine local knowledge (based on folk wisdom & experiences) with modern knowledge (based on science & experiments). To develop agriculture in India, don’t forget to mix the villagers’ ‘robust common sense’ with your science, the Prime Minister of India PV Narasimha Rao reminded Team ICRISAT on the occasion of its 20th anniversary; that was in 1992. In fact, the villagers should come first, the experts next; that is to say, go get a sense of the people first before you introduce your science. You know where you’re coming from; do you know where the villagers are coming from? In the Adarsha project, ICRISAT and partners were the first to learn their lessons, the villagers next. The top-down approach is out-of-date folks, obsolete. The bottom-up approach is right. The experts learned that in a project, the villagers must be into the development process starting from zero, that is, there is no project imposed at the beginning.

The African Market Garden (AMG) is another example of what I call optimizing the process, and which ICRISAT is helping disseminate in Africa. The AMG is a small-scale, year-round crop growing package invented at the Ben Gurion University of Israel. It is a gravity-flow drip-irrigation system for growing crops that are planted in equal distances and receive from a tank a controlled supply of water distributed through PVC pipes. Fertilizer is applied through the water, a process called fertigation. A basic AMG setup covers 500 square meters. With the AMG, high-value crops can be grown in any season of the year and there is much saving in costs.

In the last 5 years, ICRISAT has helped diffuse the AMG package in 9 Sahelian countries. The AMG concept has been embraced by about 4,000 farmers

across the Sudano-Sahel in Africa. The first technology dissemination drive was in Niger with the support of the World Bank. ICRISAT estimates a cost of \$60 to outfit an 80-square meter garden. Trees and vegetables can be grown together using the AMG setup: date palm, grapes, figs, citrus, pomegranate, vegetables – for the domestic as well as international markets.

## **DISTRIBUTING THE PROFITS**

When dryland science is doing right, the profits from work go in appropriate scale to everyone, including the farmers. An excellent example of this is the African warrantage story of Burkina Faso, Mali and Niger with sorghum and millet as initiated by ICRISAT and partners. With new, improved varieties or hybrids, villagers in those countries increased their yields by 44 to 120%, their incomes by 52 to 134% using the recommended technologies and the warrantage inventory credit system. Under warrantage, the farm produce has a double purpose: as collateral and as savings. The farmers are required to store part of their harvest as collateral for a loan from a community bank. The grains stored are sold later in the year when prices are higher, to pay off the loan and buy inputs for the next cropping season. And the wheel of prosperity continues to turn for everyone.

## **ENCOURAGING THE PEOPLE**

Encouraging the people means planting the seeds of knowledge and cultivating the seedlings of active participation in development by the villagers themselves for their own good, including the collaboration of Government leaders, private sector (investors, donors, entrepreneurs), and media (broadcasters, journalists, writers, bloggers too). All dreamers must be doers.

ICRISAT is encouraging the setting up of rural telecenters, information kiosks and village information centers. The Virtual Academy for the Semi-Arid Tropics (VASAT) is the most popular knowledge product/service of ICRISAT in this field. This is an informal knowledge coalition that connects villagers to experts via modern information and communication facilities to arm the villagers with knowledge with which not only to react but pro-act, that is, not only to mitigate the effects of drought and desertification, but to plan ahead.

ICRISAT has been conducting media workshops, the better for the journalists to understand biotechnology, among other modern tools of science. The Institute also conducts training online and onsite; it also prototypes new methods of learning for development.

The Institute's Jaswant S Kanwar Library is one of the most accessible agricultural research libraries in India. Access is the key to knowledge use.

To encourage the farmers, ICRISAT has been organizing Farmers' Days in India, Malawi, Zimbabwe and Niger and other countries in the Sub-Saharan Africa. To see is to believe.

Going after higher media exposure to encourage more people, we have it on good authority that ICRISAT's profile is much larger today, and more visible, than 6 years ago. Team Captain William Dar himself has been contributing think pieces as an opinion leader in *The Hindu*, a newspaper in India.

ICRISAT considers the media as a partner in development. Media is the message multiplier, building bridges with the stakeholders – policy makers, donors, research institutes, universities, civil society and farmers.

Entrepreneurs are encouraged. Behind ICRISAT ABI is the idea of inviting fledgling businesses to the Patancheru campus where they can be nurtured with facilities, technologies, equipment and expert advice provided by ICRISAT partners. Thus the sweet sorghum project of Rusni Distilleries which is now commercially producing 40 kL of ethanol everyday.

So, overall, does ICRISAT pass The New 4-Way Test of Science? With colors flying, I dare say.

Before I forget, I must emphasize that the achievements of ICRISAT are those of Team ICRISAT and not just the Team Captain (not to mention the partners). Yes, as the book puts it, I know 'ICRISAT is filled with dedicated experts who have keenly studied the needs of poor farmers especially in Asia and Sub-Saharan Africa.' That's the Team.

In his more ebullient mood, the Team Captain refers to ICRISAT as 'a global center of scientific excellence for dryland agriculture.' Sir, I think ICRISAT is a global center of scientific excellence and relevance. Global excellence, local relevance. Excellence is in the details and relevance. All for one, one for all. Working with 5 mandate crops – chickpea, peanut, pearl millet, pigeonpea, sorghum – the Team at work is science at its best for the drylands of the world. Helping to develop the future today.

*– Published 19 December 2008 in American Chronicle*



ICRISAT

Science with a human face.

**ICRISAT  
IS  
OUTSTANDING AGAIN.**

**TEAM ICRISAT  
IS  
GREAT!**



## **WILLIAM DAR DARES. THE 4 ELEMENTS OF TEAM ICRISAT'S SUCCESS**



**N**o. The way to success is not a yellow brick road; there's no Alice in Wonderland; and I'm not Frank Baum. Yes! Success is a journey. 2000 January. It doesn't look good. Up to the year before, ICRISAT has been languishing, its staff decreasing and its funds diminishing – you can almost smell the air of failure. This month, William Dollente Dar assumes office as the new Director General of ICRISAT. Dar has to think fast – and he dares not pick up where others have left off and instead dares to start something else. No guts, no glory. Nothing tried, nothing gained. Nothing risked, nothing learned. It calls for a new beginning.

'Our new agenda is science with a human face for improving the livelihood of the 300 million poor inhabiting the semi-arid tropics ... across the globe,' Dar tells whoever cares to listen (G Venkataramani, 04 March 2000, hindu.com). They listen. You get the message, don't you?

Science with a human face. Five short words and William Dar revolutionizes modern science by saying them – and doing them. And so I see: Science as people, not process; science as man, not method; science as product, not potential; science as servant, not master. (I know William Dar refers to himself as Servant Leader, not separating faith from facts, religion from science. You cannot separate your heart from your head.)

A little cautiously, in the whole of 2000, ICRISAT dedicates itself, according to Dar to:

- (a) Transform watersheds into 'wealth generators' for the poor
- (b) Optimize the use of scarce soil nutrients
- (c) Reduce costs and minimize hazards of pesticide use
- (d) Open the doors to biotechnology
- (e) Network
- (f) Focus on women.

The work is heavy and the workers are few?

2000. This year, the Chinese Government honors ICRISAT scientists KB Saxena and LJ Reddy with the Jin Xiu Jiang Award for their work with new, improved pigeonpea – thereby restarting its cultivation in China. The Chinese use pigeonpea not mainly as food but as green manure on sloping lands to stop erosion as well as enrich the soil. They know their organic matter, which conserves water too.

2000 December. 'ICRISAT scientists are working to break the age-old link between drought and famine,' says Ian Johnson, Chair of the CGIAR and Vice President of the World Bank; he is speaking at the CCD (Convention to Combat Desertification) being held in Bonn, Germany (Annual Report 2001, ICRISAT). He is talking about the CGIAR's DMP (Desert Margins Program), convened by ICRISAT, for some of the most disadvantaged peoples in the world: Botswana, Burkina Faso, Kenya, Mali, Namibia, Niger, Senegal, South Africa and Zimbabwe.

The DMP is being implemented by the UNEP (United Nations Environment Programme) and executed by ICRISAT. The DMP is a collaboration of 9 national research institutions, 3 regional networks, 5 non-governmental organizations, 5 CGIAR centers, 4 advanced research institutes and universities, and 10 development investors and international organizations, including EU, IDRC, GTZ, UNDP and USAID (dmpafrica.net). This is a good example of the mammoth and multi-mutual outreach that is necessary to help solve global problems, and ICRISAT is in the thick of it.



Within the year, to put on the human face to science, ICRISAT launches the Grey to Green Revolution, and can then report (William Dar, Message from the Director General, Annual Report 2001, [icrisat.org/media](http://icrisat.org/media)):

*The poor of the dry tropics are learning how to grow their way out of poverty, using an ever-increasing number of technologies, knowledge, institutional partnerships, and support networks that national, regional, and international organizations in the public, private, and non-governmental sectors have worked together to develop over recent decades. We are proud to have made significant contributions within these partnerships.*

I think the key word there is network. Thus, a partnership is a network of two; support systems and structures and staffs are a network of many. I see networking as integrating, together putting the production, delivery and distribution of science goods and services. I differentiate: The idea of putting together is not the same as the idea of together putting – the first is product-conscious and focuses on what is being put together; the second is producers-conscious and focuses on working together putting together some product or service.

I say the ICRISAT lesson of 2000 is networking.

*2001 July.* Venkataraman Balaji, Head of Information Systems of ICRISAT, wins the World Technology Award in the World Technology Summit in London, a gathering of more than 200 of the globe's major players in information technology: scientists, technologists, entrepreneurs, industrialists, financiers, journalists, policymakers ([icrisat.org/media](http://icrisat.org/media)). He has invented a low-tech-high-tech question-and-answer system serving in-out data and information useful for farming and fishing in 10 villages in Pondicherry in South India. An Internet service for the Internet illiterate.

In September 2001, KB Saxena, pigeonpea breeder of ICRISAT, receives China's highest national honor, '2001 Friendship Award' for reviving Chinese farmers' interest in pigeonpea as a source of food, fodder, fuel, and fertilizer ([icrisat.org/media](http://icrisat.org/media)). The Chinese give credit to whom credit is due.

*2002.* From where I sit, I see that ICRISAT extracts from the outside lesson of networking the inside lesson of teaming; thus is the dream 'Team ICRISAT' now given flesh, which greatly boosts staff morale ([bar.gov.ph](http://bar.gov.ph)). In January

I say the 4 components of lasting success must be what the team captain strives at along with the members of the team. There is no team without members.

of that year, ICRISAT undergoes a major restructuring, and Martha B Stone, Chair of ICRISAT Governing Board, happily reports: 'The staff has signed on to the concept of Team ICRISAT.' All for one, one for all; they are more than the famous Three Musketeers for one science.

In the same year, ICRISAT wins 2 awards: the King Baudouin and CGIAR Best Scientist. The first is awarded once every 2 years, the second yearly.

2003. Jonathan H Crouch, an ICRISAT staff, wins the Promising Young Scientist Award from the CGIAR. As well, ICRISAT is rated Superior by the CGIAR ([icrisat.org/media](http://icrisat.org/media)).

2004. Lava Kumar, another ICRISAT staff, wins the Promising Young Scientist Award from the CGIAR. ICRISAT wins another King Baudouin Award, this time for collaborative research with the Rice-Wheat Consortium for the Indo-Gangetic Plains ([icrisat.org/media](http://icrisat.org/media)). This is an unequalled 4th such award for ICRISAT, the first being won in 1996 and the second in 1998. Again, ICRISAT is rated Superior by the World Bank.

2005. The President of India inducts Sushma Reddy, Manager of ICRISAT-VASAT Information and Communication Technology-mediated information hub at Andhra Pradesh, as a fellow of the Jamsetji Tata National Virtual Academy for Rural Prosperity. ICRISAT wins the World Bank's Development Marketplace Award for 2005.

2006. There are 2 honors: Ram P Thakur, plant pathologist of ICRISAT, wins the CGIAR Outstanding Scientist Award and ICRISAT wins the Outstanding Partnership Award, shared with 10 CSOs (civil society organizations) . The ABI initiative of ICRISAT receives the Best Technology Incubator 2005 Award from the Ministry of Science and Technology of India ([icrisat.org/media](http://icrisat.org/media)).

2007 *June*. ICRISAT has just been rated Outstanding by the CGIAR for its overall performance in 2006. That is, Outstanding among the 15 international centers of the CGIAR.

2008 *June*. ICRISAT has just been, again, rated Outstanding by the CGIAR, for its overall performance in 2007.

How can a consistent loser transform itself into a consistent winner? The key word there is transform. When it comes to an institution, it's the team members who do make it happen – or do not. And when it comes to any team, it's the captain who leads them to victory, or defeat, or lackluster performance.

This time, I want to understand how is it that ICRISAT has been a consistent high achiever; since I cannot for the love of me study ICRISAT senior staff, I will content myself with a little study of Captain of Team ICRISAT William Dar.

What motivates this Ilocano from faraway Philippines to inspire himself and lead other people to excel in their science in India and in other countries in Africa and Asia? Think out of the box of science. The way I see it, in essence, science is the business of knowledge applied to generate more knowledge,

which may take the form of product or service. Now then, since we are in business, to comprehend success, let us learn from business management.

To appreciate continuing high performers, according to one study by two Harvard professors of business administration, Laura Nash and Howard H Stevenson, there are 4 'satisfactions of enduring success,' and these are (Martha Lagace, June 2002, 'Four Keys of Enduring Success: How High Achievers Win,' hbswk.hbs.edu); noting the same Harvard study but stating differently, there are 4 'desired ends' of success (James Heskett, May 2004, 'How Much Is Enough?,' hbswk.hbs.edu); or, there are 4 'components of success' (Paul B Brown, April 2004, 'Off The Shelf; Turning Success Into Fulfillment,' query.nytimes.com). Combining the explanations of Lagace, Heskett, and Brown, here's my version of the 4 elements of success as seen through the eyes of Nash & Stevenson – AHSL:

*Achievement.* Successful people compare their very own accomplishments favorably with those of others with similar goals.

*Happiness.* Successful people are contented or well-pleased with their lives at the moment.

*Significance.* Successful people see the impact they have on the lives of others they care about.

*Legacy.* Successful people see their accomplishments or values infused into the lives of others as to help them find success themselves.

Nash & Stevenson have learned that successful people are 'grappling with all 4 satisfactions almost constantly' (Lagace). To me, that is the same as saying, 'To succeed is to achieve for yourself and be pleased with your life, and at the same time to have a measurable impact on the lives as well as quantifiable effects on the values of others.' Significance is current; legacy is current extending into the future. And: To know when you have enough success takes some getting used to.

I say the 4 components of lasting success must be what the team captain strives at along with the members of the team. There is no team without members. So, Achievement, Happiness, Significance and Legacy are the 4 elements of the success of Team ICRISAT.

William Dar, high-achieving Team Captain, starts with a low-achieving not-quite-a-Team ICRISAT. From what I know of him, he has learned his brand of management in the Philippines and in India on the job, by the mouth, by the ear, by the eyes, by the mind – hands-on, asking questions, listening, reading, thinking. Learning, making mistakes. He never forgets that even as he is the leader and in the limelight, as a manager, he is only a section of a bigger picture, remarkable as he may be, a part of the quilt work.

His mark is everywhere, if not obvious. For instance, it intrigues me that the succession of titles of the annual reports of the International Crops Research Institute for the Semi-Arid Tropics itself implies a story of continuing growth, of long-term success – a creative mind at work:

*2001: Grey to Green Revolution*

*2002: Research for Impact*

*2003: Building a Strong ICRISAT*

*2004: Sowing Seeds of Success*

*2005: Germinating the Seeds of Success in the Semi-Arid Tropics*

*2006: Nurturing the Seeds of Success in the Semi-Arid Tropics*

*2007: New Horizons of Scientific Excellence for the Semi-Arid Tropics*

Another way of looking at Nash & Stevenson's 4 dimensions of enduring success, AHSL, is to look at them as part of an acronym: ACHILLES, to mean Achievement, Happiness, individual Limitations, Legacy and Significance. Do not forget that our individual limitation is our Achilles heel, our weakness. While aware of his own limitations and those of others, in his managing William Dar nevertheless dares to achieve, to be happy, to leave a legacy, to be significant.

As I see it, Team Captain William Dar dares his Team to succeed; and he dares the rest of us in the name of creative capitalism to work out personal benefits along with social growth. If we are so smart, why aren't we in The Smart Revolution?

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# About ICRISAT



The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a nonprofit, non-political organization that does innovative agricultural research and capacity building for sustainable development with a wide array of partners across the globe. ICRISAT's mission is to help empower 644 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics through better agriculture. ICRISAT belongs to the Alliance of Centers of the Consultative Group on International Agricultural Research (CGIAR).

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