The Commons, Communities and Climate Change

NARPAT S JODHA, NAVEEN P SINGH, CYNTHIA S BANTILAN

Rural common property resources represent the historically evolved institutional arrangements made by communities in dry regions (in the present case) to guard against the vulnerabilities and risks created by the biophysical and environmental circumstances characteristic of these areas. Despite their valuable contributions, CPRs are faced with decline in terms of both extent as well as contribution to the people, and therefore consequent neglect by the communities. This paper looks into the process of this negative change, and attributes the same to public policies, market forces and population growth (accentuating land hunger) along with the disintegration of traditional collective approaches of communities to maintain CPRs as community assets.

Narpat S Jodha (*njodha@icimod.org*) is policy analyst at the International Centre for Integrated Mountain Development in Kathmandu, Nepal. Naveen P Singh (*np.singh@cgiar.org*) and Cynthia S Bantilan (*c.bantilan@cgiar.org*) are at ICRISAT, Hyderabad.

1 Introduction

The rural commons or common property resources (CPRs) essentially are communities' institutional arrangements to collectively manage and harness their natural resources to complement the gains from individually owned or used natural resources. Furthermore, many of these commons, due to their specific features such as fragility, marginality, poor accessibility, limited divisibility for efficient high-intensity usage, etc, are unsuitable for individually managed agricultural enterprises.

However, to ensure gains from commons, including collective risk sharing, a variety of physical products and ecological services (besides many economic benefits), the communities have evolved and enforced a number of norms and practices about usage and protection of commons. Disregard of enforcement implies decline and depletion of commons, as indicated by field experience and research. In fact, in recent decades, the rural commons are declining rapidly in different parts of developing countries including India. The important driving factors behind this change process are:

(i) Weakening of communities' collective concerns and actions to protect and conserve CPRs, resulting from a gradual decline of traditional social cohesion. The latter is reflected by increasing priority to private gains (overexploiting commons and encroachment into CPRs), directly or indirectly encouraged by public interventions and market forces as well as the land hunger induced by population growth.

(ii) Public policies and programmes including those induced by economic globalisation, etc, such as converting CPR spaces into mining areas, protected areas and parks for a variety of economic and environmental concerns, and transfer of management responsibility of such areas to formal public agencies with very little involvement of primary stakeholders, that is, rural communities. The above anthropogenic interventions are increasingly complimented by accelerating climate variability.

This article focuses largely on the above aspect of the change with specific reference to arid and semi-arid tropical areas of India. It also looks at the dynamics of change resulting from the interactions between man-made and nature-driven processes affecting CPRs.

2 The Approach and Information Base

This paper is based on various studies that directly focus on CPRs, as also those that deal with agriculture and the relevant aspects of its transformation processes in India's dry regions since the 1950s. In particular, the studies include (i) a comprehensive study during 1982-86, covering multiple aspects of

CPRs and spread across 90 villages from 23 districts belonging to arid and semi-arid parts of seven states of India (Jodha 1986); (ii) revisits to some of the villages covered by the 1982-86 study plus some additional villages in the same areas with greater focus on issue-based qualitative information, including verification visits to the fields and plots of farmers during different years over the period 1995-2010; (iii) longitudinal village-level studies (VLS) carried out by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in different phases from the mid-1970s onwards, and more recent studies and operational programmes by ICRISAT and partner institutions like the Central Research Institute for Dryland Agriculture (CRIDA) on climate change and farmers' adaptations to climate change (Banerjee et al 2011; ICRISAT 2010; Jodha et al 2010).

The discussions in this paper are organised in terms of (a) centrality of CPRs in farmers' strategies to manage natural resources and risks in the highly unstable and low productive biophysical and agro-climatic environments in the dry regions of India; (b) weakening of traditionally evolved CPR-centred community strategies in the context of a changing institutional and economic situation and the driving forces behind the same, as well as some local-level initiatives of communities to adapt to the negative changes; (c) changing magnitude and complexity of the above driving forces in recent years adversely affecting CPRs and marginalising the local communities as well as some renewed adaptation measures against the negative changes; (d) the role of climate change in accentuating the process of decline of CPRs; and (e) conclusions indicating some future prospects of CPRs-based on all of these.

3 Centrality of Commons in Dry Land Context

Rural commons or CPRs are institutional arrangements evolved by communities to collectively manage and use their natural resources. They also formed the component of rural people's strategies for adjusting to harsh and stressful environmental conditions (Berkes 1989; Bromley and Cernea 1989). The CPRs in dry and other regions of India broadly include: community pastures, community forests, village wastelands, watershed drainages, ponds, rivers/rivulets, their banks and beds, etc. They serve as sources of important farm products and services, complementing the private resource-based farm enterprises (Ghate et al 2008). Production environments of dry lands, characterised by low and variable rainfall, frequency of droughts, erodible and low fertility land, nature's low regenerative capacities and limited as well as high-risk production options have several implications at regional, village/community and farm household levels, which favour the provision of CPRs in arid and semi-arid regions of India.

For instance (Figure 1), at the regional level, the aforementioned low and unstable production possibilities restricted population growth, encouraged market-wise disregard and isolation of villages, and did not attract technological and institutional interventions from outside. All these circumstances offered limited incentives for privatisation of vast fragile and marginal land area for cultivation and thus helped in retaining them as CPRs.

Figure 1: Circumstances Historically Associated with CPRs in Dry Regions*

Natural Resource Base and Agro-Ecological Features*
(Low and variable precipitation; heterogeneous including submarginal fragile land resources unsuited to intensive use, nature's low regeneration capacities; limited and high-risk production options; etc)

⇓

Implications and imperatives at

Regional Level	Community Level	Farm Household Level
a Low population pressure; market isolation; limited technological and institutional interventions	a Heterogeneity; fragility of resource base; inadequacy of private risk strategies	a Narrow, unstable production base, diversified, biomass centred land extensive farming systems
b Limited incentives and compulsions for privatisation of CPRs	b Balancing extensive intensive land uses, and focus on collective risk sharing	b Reliance on collective measures against seasonality and risk
c Overall circumstances (a), (b) favourable to CPRs	c Community response to (a), (b); CPRs (protection access, usage, etc)	c Induced by (a), (b), stronger focus on complementary CPR-PPR-based activities

(*) The above discussion and data largely taken from Jodha (1995), based on a comprehensive study of CPRs during 1982-86 (Jodha 1986, 1992).
Source: Adapted from Jodha (1995).

At village community levels, the heterogeneity, fragility and marginality of land resources, along with the paucity and variability of rains, made it difficult to fully harness the potential of land resources through arable farming and adequately meet dry land risks through private resource-based crops farming alone. Balancing intensive (by cropping) and extensive land usage systems (through provisions of pastures and community forests, etc), as required by the natural resource features, became a part of collective strategies for risk management and production enhancement to sustain livelihoods (Jodha 2008b).

At the farm household levels, despite practising crop-livestock-based mixed farming, diversified cropping and other components of extensive farming systems, the narrow farm production base (including rainwater harvesting and water ponds) could not ensure full protection against risks due to temporal and spatial variability of rainfall in the dry areas. Hence, dependence on collective risk sharing and complementarity of private property resource (PPR) and CPR-based activities became necessary. This again favoured the provision of CPRs.

The features of an agro-climatic environment and related adaptive measures described above can be observed in most arid and semi-arid areas. However, once aggregated at the macro level (for example, district or block level) the picture detailing agro-climatic environmental conditions determining the space for CPRs gets blurred. To clarify, one can compare the situation in two sets of villages – one with high environmental stress and the other with lower environmental stress (Table 1, p 51). Here, first the CPR-promoting variables (low rainfall and its variability, length of crop growing season, frequency of droughts, extent of submarginal lands, extent of unirrigated lands, etc) are presented. Information on adaptation measures against these features follow. This not only covers the extent of CPRs in the villages but also shows the extent of CPR-favouring measures

and practices such as population density, extent of collective risks sharing practices, extent of dependence on CPRs, etc.

The relevance and role of CPRs is greater in areas where biophysical and agro-climatic conditions are more risky, less conducive to normal crop farming and call for collective measures to complement the individually focused practices for enhancing production prospects and reducing uncertainties and risks (Table 1).

4 Weakening of CPRs

In this section we focus on the changing status and space for CPRs and the role of man-made circumstances therein. An important inference from the preceding discussion (including Table 1) is that as long as the environmental conditions calling for collective measures against agro-climatic risks and inadequacies of individually-focused production strategies prevail, the role and relevance of CPRs as a resource management strategy will remain undiminished.

However, in India's dry lands, despite the persistence of biophysical environmental stresses, CPRs are rapidly marginalised. The basic cause is the decline of community concerns and collective action to protect and sustain CPRs as community assets. The interlinked key driving forces behind this change are state policies (interventions), market forces and the rural communities themselves. To compound matters, climate change or variability adds to the impact on CPRs by influencing community decisions and actions.

One simple and logical approach to reflect on the aforementioned factors and processes marginalising CPRs, as well as their ecological and socio-economic contributions, is to look at the reversal of historically evolved understanding and strategies favouring CPRs, represented through Figure 1. To facilitate this, the contexts of the same are presented in reverse form, and thereby reflect on the emerging ground realities disfavouring CPRs.

The rapid decline of CPR area and productivity is well recognised. Factors that contribute to this are documented at both micro and macro levels (Arnold and Stewart 1991; Ghate et al 2008; Jodha 1992). Figure 2 (p 54) indicates this process of change and the CPR-discouraging components. The state's role is complemented by market forces and new technologies, etc, at regional levels. At community levels, the same forces (including side-effects of development interventions) encouraged enhanced community differentiation and consequent decline of traditional collective resource management systems. Replacement of community mandates by state rules, and acquisition of local commons for various public projects, further alienated communities from CPRs. At the level of households, reduced area, low productivity and the hopeless situation of CPRs made them unattractive thereby accentuating people's indifference towards CPRs. This also encouraged community members to grab CPRs as a private resource rather than manage them collectively. Jodha (1992) reports quantitative details on these and related negative changes. However, some of the details relevant to the present discussion are summarised in Table 2 (p 52). The changed situation is broadly depicted by Figure 2.

Despite all the details, the above information is quite dated (that is, collected nearly 25 years ago) and serves a largely illustrative purpose of changes in CPRs two decades ago. To update the same findings from the revisits made to some of the villages, long-term data from ICRISAT's VLS is presented below.

5 Results of 'Revisits'

The results from the revisits are summarised by Jodha (2008a, 2008b, 2010). They reflect both the positive and negative aspects of the changing CPR situation. They were more focused on emerging issues, especially qualitative dimensions. The information was of change, gathered through focused discussion groups in the villages, supplemented by verification

Table 1: Extent of CPRs and Other Collective Risk-Sharing Strategies in Villages with High and Low Levels of Environmental Stress*

Details of Stress and Strategies	Situation (Range of Values of the Variables) in the Villages	
	High Environmental Stress (Villages 28)	Low Environmental Stress (Villages 22)
A Indicators of Stress		
• Annual average rainfall (mm)	300-700	800-1,150
• Rainfall variability (coefficient of variation %)[a]	33-39	18-21
• Length of crop growing seasons (days)	65-90	85-220
• Events of drought/crop failure in five years (no)	2-3	0-1
• Area of submarginal lands in village areas[b] (%)	69-82	8-13
• Extent of irrigated crop lands (%)	0-6	10-33
B Adaptation Measures		
• Households with dominance of livestock in mixed farming	68-84	4-9
• Households with natural vegetation as principal source of (fodder) biomass (%)	38-52	5-7
• Proportion of areas under crops with high stalk-grain ratio (%)	71-93	27-38
• Extent of collective sharing practices in the village[c] (no)	9-13	3-5
• Households using more than four CPR products as input in private farming (%)	76-84	13-27
• Share of CPRs in village areas 1950-52 (%)	39-58	15-23
• Population density 1951 (no/km^2)	37-49	105-182

* = The distribution of two sets of villages – with higher or lower degrees of biophysical stress – is as follows: Andhra Pradesh (3,4), Gujarat (4,5), Karnataka (4,3) Madhya Pradesh (4,2) Maharashtra (4,3), Rajasthan (6,2), Tamil Nadu (3,3).

a = Coefficient of variation of rainfall based on rainfall records at district/taluka headquarters.

b = Submarginal land includes areas with sandy and unfertile soils, high extent of salinity, rocky and undulating topography, waterlogged areas, perennial weeds, shrubs, etc, not suitable for cultivation.

c = Collective sharing activities include collective upkeep and protection of CPRs. Common use of private land during non-crop season, seed sharing, desilting of village ponds, maintenance of catchments of percolation tanks, joint field operation during crops season, fodder stocking for charity, maintenance of village bulls, contributory fund for common facilities (including joint litigation for village interests), etc.

Source: Table adapted from Jodha (1995). Data collected for the study of CPRs from 93 villages from six states in dry tropical regions of India from Jodha (1986).

Table 2: Quantified Details on Changes Adversely Affecting Extent and Status CPRs in Study Villages of Dry Regions[a]

	Details of Change	Range of Values Reflecting Change over Time	
		1950-52	1982-84
A	General		
	Population density (no/km^2)	37-49	69-98
	Distance from nearest market centre (km)	18-26	7-21
	Cropped area cultivated by tractor (%)	0-1	18-69
	Cropped area irrigated (%)	0-6	3-18
	Cost of dry lands at 1980 prices (Rs/ha)[a]	450-700	1,500-2,500
	Extent of CPR areas privatised (%)[b]	0-0	30-63
B	Incidents of CPR privatisation		
	a Land distribution camps by the government (no)	0-0	8-12
	b Illegal land grabbing cases regularised (no)[b]	0-0	18-26
C	Community-level activities by:		
	a Villagers' group action (no)[c]	9-13	3-5
	b Government agencies (no)	0-3	6-8
D	During drought/scarcity households mainly depending on		
	a Public relief (no)	5-9	73-82
	b CPR products, collective supplies groups action (no)	63-80	15-17
E	CPR extent and products		
	a Households using (>4) CPR products and farm input (no)	76-84	18-22
	b Proportion of CPR areas in village land of the village (%)	39-58	16-28

(a) is based on limited number of land transactions in different villages.
(b) indicates the cumulative situation since the land reforms of 1950-52.
c = Information that relates to the early 1960s and late 1970s for over 15 villages of Rajasthan, Gujarat and Maharashtra for which studies on the impact and adjustment to drought were conducted.
Source: Adapted from Jodha (1995). The data relates to 28 villages with high degree of biophysical stresses (Table 1).

need-based farm and CPR plot visits covering specific aspects of CPR management, seen most through CPR units rather than overall CPR areas including depleted, unusable parts. Some relevant details are as follows:

(1) Area protection of units – not only decline of area – was 0% but area recovered from past encroachment was 3%.

(2) Extent of physical protection/rehabilitation by fencing/trenching/ridging was 31%.

(3) Introduction of high value plant species was 32%.

(4) Focus on high value marketable products was 42%.

(5) Reduced emphasis on low-cost biomass primarily for self-provisioning was 60%.

(6) New CPR-PPR links through plant choices was 36%.

(7) Focus on manageable scale factor (for example, sub-grouping of CPR users, selected CPR units, etc) was 90%.

(8) Changing rich-poor alliances reflected through joint management of CPR units was 28%.

(9) Short-term visibility of gains of new unit-based changes was 45%.

(10) Collective response to increased scarcity-vulnerability was 33%; positive side effects of political factionalism was 15%.

Besides the above, the limited reorientation of public programmes reflected through changed approach and attitude of government officials (in association with concerned NGOs) also helped CPRs. This was seen in programmes dealing with natural resource rehabilitation/development, drought relief policies and activities, local infrastructure development, changing thrust of agricultural and natural resource focused research and development (R&D), etc (Jodha 2008a).

It may be reiterated here that the revisits to different areas during different years were informal side activities, conducted while visiting the same areas for projects of different organisations like the World Bank, International Fund for Agricultural Development (IFAD), United Nations Environment Programme (UNEP) and ICRISAT, etc (ibid).

To summarise, we first put together some indicators of emerging changes in CPR management and then list some indicative issues (lead lines) for researchers, field agencies and policymakers to explore new possibilities to help rehabilitate CPRs.

(A) Emerging Changes

(a) Villagers under the changed circumstances focus on specific CPR units (based on their potential and productivity) to suit current situations rather than feel concerned about the overall magnitude of total CPRs. Thus, productivity promotion is one of the lead lines to help rehabilitate and promote CPRs. This calls for a disaggregated approach to CPR management (that is, a focus on specific CPR units rather than total CPR areas).

(b) Increased emphasis on economic concerns and shifting priorities for CPR products and their usage. This has guided communities' approach to allow individuals or groups to develop and commercially use CPRs with some sharing arrangement with village institutions, infrastructural development activities, etc.

The potential complementarities visible between specific CPRs and sectoral public programmes (for example, on soil conservation, reforestation, water harvesting, watershed development, etc), should be identified and used as a driving factor for rehabilitation of CPRs. Similarly, the possibility of using field-level sectoral project officials as change agents clearly visible in many areas should be harnessed.

(c) Area-specific grazing pressure reduction approaches (for example, grazing supplemented by stall feeding of animals for modern dairying, stall-fed small ruminants, etc) have good scope for popularisation.

Increased extent of CPR-PPR complementarities, especially in the areas focused by agricultural R&D initiatives, is another area for specific focus.

(B) Potential Lead Lines for Future Explorations and Action

(a) Due to a number of spatial differences in CPR situations (even within a village), in place of a uniform approach to all situations, remedial approaches should have need-based diversity. Hence there is a practical need for a disaggregated approach to CPR investigations by focusing on CPR units to complement the conventional aggregated approaches. The

same approach can be extended to other community-centred programmes such as joint forest management (JFM), watershed development, wasteland development, etc, Syamsundar (2008), using multi-country analysis of evidence, calls for a similar approach to give hitherto largely missing attention to diversity and scale issues in public interventions that are focused on community-centred, natural resource development. (b) To address the problems associated with socio-economic differentiation and consequent decline of a community's collective stake in CPRs, promotion of specific CPR-unit focused user-group formation can be helpful. Just as treating aggregates of CPRs seldom work effectively in changed contexts, so is the case with mobilising the entire village community as against the formation and mobilisation of CPR-unit focused user groups to rehabilitate CPRs.

To enhance communities' effective involvement in CPR management, the "revisit" experience suggests that the high value products, including their yields, markets, etc, get higher priority over bulky biomass for self-provisioning purposes. The CPR-PPR complementarities are now based on marketing and income generation rather than just on biomass in a largely subsistence-oriented context of CPR usage. Accordingly, strategies and incentive systems for rehabilitation and promotion of CPRs need to be more sensitive to the commercial dimension of CPR use. However, to guard against the rural poor being bypassed in this process and commercial agencies cornering the new opportunities for themselves, sufficient precautions and measures (that is, through accountability and participatory actions) will be necessary to promote the above approach.

For the CPR change programme and its implementation, closer collaboration in terms of regular task-centred interactions between field-level departmental workers (for example, from forestry, rangelands, soil conservation, and watershed development, etc) on the one hand and CPR-user groups on the other is essential. Identification and engagement of new change agents and mobilisers (such as ex-servicemen, schoolteachers, field-level NGOs and R&D workers, etc) can be helpful as the "revisits" to some villages indicated.

(C) Some Macro-Level Developments That Affect CPRs

The results of the "revisits", as well as some evidence from the situations in other regions (FES 2010; IASC 2011), raise hopes about the future of CPRs at micro-village levels. Given some incentives, appropriate opportunities and support, CPRs can be rehabilitated and promoted to help rural communities and others.

But in the macro context, the emerging scenarios do not look so favourable to CPRs. The reason for this is the earlier mentioned key driving forces (particularly the state and private corporations) with their expanded mandates and capacities that tend to directly or indirectly contribute to the decline of CPRs. Their new steps towards exploiting natural resources often go against the community-owned, managed and utilised CPRs. The key factors of the change process are:

(i) Induced by provisions, pressures and incentives provided by the agencies promoting rapid economic globalisation; the state (often in collaboration with private sector corporations) has planned and implemented several schemes and activities (for example, mining, industrial activities and related infrastructure and special economic zones (SEZs), etc) which also tend to control natural land resources and products available through CPRs to the rural communities.

(ii) Induced or compelled by rising concerns and pressures of environmentalists, the state often extends its control over community natural resources such as forests, rangelands, water bodies and different unique landscapes hitherto managed and used by communities. Promotion of protected areas, environmental/public parks, and biodiversity reserves, etc, are some examples. To this, one can add some other public utilities and their supporting infrastructures, such as new urban colonisation, schools, offices of local administrative and development agencies, etc, which curtail the areas of CPRs.

All the above and associated activities (displacing traditional CPRs) are often justified in the interest of economic development and welfare activities for the national public at large. Besides, most of the proposed initiatives/activities are in keeping with the shifting long-term national priorities of the government.

Without questioning the adverse effect of this reasoning on CPRs, the policymakers' attention can also be drawn to the following issues.

(i) While discarding CPRs, has any thought (matched with practical action) been given to low-cost alternatives to help the traditional CPR users (mostly poor people)? How about the involved sacrifice of larger gains from CPRs in terms of ecological and environmental services?

(ii) In many cases the above services and efficiency/equity concerns are served better by community-managed CPRs compared to government or private sector managed natural resources, as most of such agencies are rarely known for their micro-level, place-based understanding of the realities and are usually governed by remote considerations.

However, our concern in this discussion is about how people (CPR users) would adjust to the loss of CPRs initiated by macro-level decisions and actions, especially when CPR users are unable to mobilise themselves at macro levels to negotiate their livelihood issues with policymakers. This problem is further accentuated by demographic trends visible in many areas, where the capable young generation, with limited interest and earning opportunities in rural areas, is increasingly turning to migration to urban areas rather than engage in agriculture and CPR management (Jodha 2010).

6 CPRs: Impact of Climate Change

Besides man-made circumstances, particularly at macro levels in recent years, climate change or variability has created greater risk for survival and usability of CPRs.

It may sound ironic that CPRs, which historically evolved as a part of rural communities' strategies against agro-climatic-environmental risks, are now getting discarded in the face of problems associated with climate change or variability. The recent positive changes in CPR management practices, as

Figure 2: Circumstances Adversely affecting the Extent and Status of CPRs in Dry Region

Recent economic, institutional and technological changes influencing the patterns of resource use (1950s to 1980s) (increased physical and market integration; increased extent and changed nature of public interventions; increased demographic pressure, etc; shaping the pace and pattern of rural development)

⇓

Implications and imperatives at:

Regional Level	Community Level	Farm Household Level
A Population growth accentuating land hunger	a Development-led differentiation of rural community and decline of collelctive strategies for resource management, risk sharing, etc.	a Reduced areas and productivity of CPRs Marginalising their contribution to diversified and biomass-centred production strategies.
B Public policies enhancing legal/ illegal opportunities for privatisation or or state control of control of CPRS	b Disruption of communities' mandates/initiatives by the state through legal, admin-legal administrative and fiscal means.	b Individualisation of adjustment measures against risks, enhanced risks, enhanced dependence on public relief,etc.
C Technologies and market forces activating the land market, extending to fragile	c Emphasis on acquiring CPRs as private property rather than for use collectively.	c Reliance on private resources, market links, non-biomass-oriented technologies, etc.
D Overall circumstances (a), (b) and (c) unfavourable to CPRs	d Due to (a), (b) and (c), rapid erosion of comm-unity concerns and group action for CPRs.	Due to (a), (b), and (c), reduced reliance on complementarily of CPRs-CPR activities/ products.

Source: Adapted from Jodha (1995).

To elaborate on the above aspects it helps to juxtapose, on the one hand, the relevant attributes and functions of the different categories of CPRs and, on the other, the different variables constituting the climatic situation, particularly rainfall and moisture availability and, to an extent, temperature-related phenomena. At micro-village levels, precise systematic meteorological information may not be available, but the broad weather-related information plus experience-based farmers' perception of weather variability and its consequences can help in assessing the impact of climatic variables on CPRs and agriculture in general (Jodha et al 2010).

The first climatic variable which we refer to is rainfall and its variability. It directly affects surface and groundwater availability. Harnessed and utilised through tanks/ponds, often as village commons, water harvesting and moisture conservation measures, besides facilitating groundwater recharge, also help in retention of soil moisture for biomass growth in uncultivable "waste lands", pastures and forests, etc, as rural commons. Such biomass through accumulation of their litter and root systems, help in promoting what is termed "sponge", soaking up water during rainy spells and releasing it evenly during dry spells. Overall, extent as well as temporal and spatial variability of rainfall affects the contribution and productivity of the aforementioned CPRs. This is also influenced by temperature and wind variations, often in localised situations. However, for illustrative purposes, we focus on rainfall, including extreme events such as droughts as climatic events. Depending on the type of products or services from specific

Table 3: An Indicative Picture of the Impact of Climate Change on Rural CPRs

Relevant climatic variables: Extent and variability of rainfall (including extreme events such as droughts/floods); changes in duration and timings of rainy season vis-à-vis cropping season, rainfall intensities/irregularities, etc, complemented by fluctuations in heat and wind patterns affecting soil moisture situation and plant growth affecting CPR types (A) and (B) and their contributions and finally weakening the collective concern/action for them.

CPRs	Impacts	Final Consequence
A Directly water focused CPRs		
• Rain-fed irrigation tanks	Shrinkage or decline of tank area, water availability, reduced cropping possibilities, and productivity	Increased collective indifference towards CPR Privatisation process through people digging wells in the land occupied by tanks
• Village ponds	• Water shortage for humans and animals	Increased collective indifference towards maintenance
• Rivers/rivulets, their banks and beds	• Drinking water shortage; no fish, no short-term high value crops; reduced grazing possibilities	Shrinking livelihood options and opportunities neglected and further decline,and gradual conversion of irrigated land to less productive dry lands
• Groundwater used through wells,tube wells (for collective/individual use)	• Drying of wells, tube wells; decline of irrigation facility and cropping choices	
• Overall soil moisture retaining, flow regulating landscapes illustrated by (B) below	• Failure of growth and supplies of biomass, etc, due to scarcity of available soil moisture • Increased aridity and reduced productivity of CPR lands	Increased indifference of community
B Land-vegetation focused CPRs		
• Community forestry • Village pastures/range lands • Uncultivable lands • Protected vegetation areas	For want of sufficient moisture and its stability – natural and introduced plant species dry up or produced insufficient biomass and other products to sustain animals and fulfil other human needs.	• Reduced productivity and supplies/services by CPRs, create people's collective indifference to these resources • "Over use/extraction", further deplete CPRs • Grabbing parts of CPRs as private lands

Source: Based on field observation and information (Banerjee et al 2011; ICRISAT 2010; Jodha 2008a) and more recent field visits to rain-fed agricultural regions in India.

shown by the discussion to rehabilitate CPRs, may also be rendered ineffective by the impact of climate change. In the following discussion we elaborate on these aspects, with a focus on the negative changes in the contribution of CPRs and their consequences in terms of increased collective indifference towards them as community assets (Table 3).

CPRs, rainfall affects the role and contribution of CPRs, which in turn affect the communities' concerns for and management of CPRs and ultimately their changing status as the final impact of climatic phenomena on CPRs. We elaborate on this change process using some village-based illustrations from different arid and semi-arid areas of the country.

(a) Water-Linked CPRs

Before elaborating on the impact of climate change on CPRs and the implications for CPR users, we can briefly digress into villagers" perceptions and understanding of climate change. Based on group discussions at the village level involving CPR users and elderly people covered by ICRISAT's VLS and "revisit exercise" covering some of the villages studied during 1982-86, the phenomenon of climate change was recorded as per the farmers' experience-based perceptions. Accordingly, in almost all the studied villages, the process of climate change involved increased variability in rainfall during the recent 15-30 years. The changes are reported in terms of below normal rainfall, changes at the start and end of rainy seasons, frequent occurrence of mid-season shortfall or irregularities in the old pattern of annual rainfall and increased extent or frequency of periodical droughts. In some cases the same was verified through meteorological records and data (ICRISAT 2010).

At a primary level, the most significant impact of the above change has been the paucity of moisture for plant growth and undependability of water from irrigation tanks, dug wells and tube wells. This has resulted in shrinkage of tanks' command area, privatisation of uncared for parts as well as tanks' catchment space by creating dug wells (Banerjee et al 2011; Ghate et al 2008; ICRISAT 2010). The major reason for the shrinkage of tanks in recent years is the reduction of run-off water entering the tanks as a result of obstructions in the catchment area due to development. Similarly, overexploitation of groundwater through borewells has resulted in the drying up of open wells in many villages.

At the secondary stage, the consequences include decline of particular crops such as rice, sugar cane, etc, and decline in non-crop products such as fish, waterborne seasonal fruits and flowers in impounded water in field border trenches and ponds (used for self-consumption as well as marketing). Finally, this led to reduced incomes for CPR (tank) users, and people's increasing indifference towards a collective stake in these resources (ICRICAT 2010).

Broadly similar is the story of wells and tube wells, fed through groundwater recharge, facilitated by vegetated CPR lands including pastures, community forestry and other uncultivated spaces, which when better vegetated act as a sponge to help in soil moisture stability and movement. In many villages, not only have water tables reduced (causing tube well failures, etc) but the groundwater has become saline.

The village water facilities – for example, ponds and tanks used for drinking water for people and animals – rarely fill up enough or dry much before the next rains. This is another example of the impact of climatic variability on community commons. Many villages in Rajasthan, Gujarat, Maharashtra and Andhra Pradesh have resorted to private watering options, for example, buying water through mobile tankers from distant places.

Related to the above are watershed depressions, rivers, rivulets, their banks, etc, which people use for lifting water for minor crops, high value products (for example, seeds, vegetables, fish, etc). Shrinking and drying of these resources has a severe impact on the livelihoods of the poor, as the supply of self-provisioning products such as fish and waterborne fruits and flowers is affected in particular.

(b) Biomass Producing CPRs

Next to water-linked CPRs, the important land resources representing CPRs include village pastures, rangeland, community forestry, watershed borders, wastelands, etc, which provide not only grazing space but a number of fuel, fodder and food items, particularly during the good rain years. They also have small watering points supporting vegetative growth within CPRs. Despite the hardy nature of most of the plant species in the CPRs, the shortfall and seasonal variations in rainfall adversely affect the biomass and other products. Prolonged and frequent dry spells (apart from severe droughts) reduce their production flows and lead to over extraction (including unseasonal chopping of trees and shrubs) and over grazing.

The prolonged and frequent happenings indicated above eventually lead to severe degradation of CPRs and enhanced indifference among CPR users towards their protection and regeneration. This finally leads to gradual grabbing of these land resources as private resources. This process has actually happened in most of the villages studied.

Farmers' traditional adaptation measures against climatic risks complemented by new measures based on modern science and technology as well as improved resource management systems may help in arresting and reverting the above CPR-degradation process. The new adjustment step against climate change should jointly and simultaneously address the emerging climate-led problem for private resource-based farming as well as CPRs. However, to make this a reality, development interventions will have to be made "climate sensitive". Despite loud discourse and some small-scale initiatives, this process is yet to take place. The results of "revisits" to CPRs, reported earlier, can offer some lead lines for this purpose.

Table 4 (p 56) provides some quantitative details of CPRs as affected by rainfall variability in some of the "revisited" villages. Based on villagers' recall on rainfall situations, partly confirmed by block-level offices, 40 villages were targeted. They included, under category A, 20 villages where during the last 10 years rainfall had been only 50% or less compared to the earlier period, and where four or more drought years were experienced during the previous 10 years. Another set of 20 villages under category B included the ones where, as per villagers' experience, rainfall decline was around 25% compared to the earlier period, with low or less years of significant drought.

The situation of the two sets of villages indicates the broad differences in rainfall situation and the subsequent impact of this on different CPRs, and consequent responses of the village communities. Table 4 also deals with the secondary impact on related CPR-dependent production and consumption activities as well as the extent of community concerns and management of specific CPRs reflected by presence or absence of management activities and decisions. As rows

Table 4: Impact of Rainfall Variability on CPRs in Selected Villages in Dry Regions of India

CPR Situational Events Resulting from Rainfall Variability during Last 10 Years	Villages with Annual Rainfall Deficit during Last 10 Years	
	Villages with Rainfall Decline of 50% and Four or More Drought Years (20)	Villages with Rainfall Decline of 25% or Less and Two or Less Drought Years (20)
1 No of wells abandoned or very rarely used for want of enough water	17	4
2 No of years when community tanks were full	2	7
3 No of years when drinking waters in ponds lasted for four months or less	6	2
4 No of cases where tank beds converted into private farmland after digging wells in them	15	-
5 No of villages where collective fodder stocking/distribution stopped	20	7
6 No of occasions when village livestock migration was for six or more months in a year	9	2
7 No of cases when CPR rule violation related penalties were imposed	2	11
8 No of cases of rehabilitation of CPR lands by ridging, trenching, reseeding, etc	-	6
9 No of times CPR-related village meetings took place in 10 years	2	12

Source: Based on information collected during "revisits" of CPR study villages (Jodha 2008a).

seven to nine in Table 4 show, the extent of CPR concerns and management practices are much higher in villages with smaller rainfall decline compared to the other set of villages with higher decline of annual rainfall.

7 Conclusions

This paper concludes by integrating the key inferences from different aspects of the changes affecting CPRs and their implications for the future of CPRs as community assets in dry regions of India.

First, CPRs represent an important institutional arrangement evolved by communities to face environmental risks as well as low and unstable production possibilities in arid and semi-arid areas of India. However, despite their relevance and utility, CPRs are faced with their reduced extent and upkeep in recent decades, particularly since the 1950s, the era of post-Independence land reforms.

Reduced collective concerns of communities for CPRs, accentuated by population growth-led land hunger complemented by various public interventions and market-led processes, explain this process of negative change. This is supported by the comprehensive multi-district, multi-state study of CPRs covering over 90 villages during 1982-86. However, revisits to some of the earlier studied villages showed some positive changes reinforcing communities' collective stakes in CPRs. The big change facilitating this shift is villagers' focus on individual CPR units rather than aggregate areas of CPRs for management and high pay off productive use. This has several implications for research policy and action for rehabilitation of CPRs.

But in contrast to the above emerging micro-level scenarios, the macro-level processes governed by state policies and market forces about changing usage of natural resources (for mining, SEZs, infrastructural development, new townships as well as focus on national environmental assets through a variety of parks and protected areas, etc) displacing the CPRs in many areas do not indicate a bright future for CPRs, unless some institutional safeguards for CPRs are evolved. Besides the above, an additional threat to CPRs is posed by enhanced and more intensive level of climatic variability, which tends to reduce productivity and dependability of CPR outputs and services for rural communities. This further adds to the communities' indifference towards CPRs. The possible remedial approach against this problem may include building adaptation approaches against climate change that will simultaneously address the concern of dry land farming as well as dry land CPRs. Such measures can be built by integrated use of farmers' traditional adaptations to climatic variability and inputs from modern scientific innovations (Jodha et al 2010).

Thus, this paper presents a mix of the hope and dismay surrounding the future of CPRs in the dry regions of India.

REFERENCES

Arnold, J E M and W C Stewart (1991): *Common Property Resource Management in India: A Desk Review,* Report for the Asia Environment Division and the India Agriculture Division, The World Bank, Washington DC.

Banerjee, R, M C S Bantilan, J O Kamanda, N P Singh and Pudmaja (2011): "Vulnerability to Climate Change: A Comparative Study of Perceptions and Adaptive Capacities of Kanzara and Dokur Villages", Working Paper No 26, ICRISAT, Patancheru (AP).

Berkes F, ed. (1989): *Common Property Resources: Ecology and Community-Based Sustainable Development* (London: Belhaven).

Bromley, D W and M M Cernea (1989): "The Management of Common Property Natural Resources: Some Conceptual and Operational Fallacies", World Bank Discussion Paper 57, The World Bank, Washington DC.

Foundation for Ecological Security (FES) (2010): "A Commons Story: In the Rain Shadow of Green Revolution", Draft Report, Foundation for Ecological Security, Anand, Gujarat.

Ghate, R, N S Jodha and P Mukhopadhyay (2008): *Promise, Trust and Evolution: Managing the Commons of South Asia* (Oxford: Oxford University Press).

International Association for Study of Commons (IASC) (2011): "Sustaining Commons: Sustaining our Future" Volume of paper, Abstracts, presented at the 13th Biennial Conference of the International Association for Study of Commons, January 2011, Hyderabad, Andhra Pradesh.

ICRISAT (2010): *Vulnerability of Climate Change: Adaptation Strategies and Layers of Resilience: Understanding Farmer's Perceptions to Climate Change in Semi-Arid Tropics of India-Local Observations, Natural Resources and Socio-Economic Trends (DVAFT)*, Global Theme on Institutions, Markets and Policy, ICRISAT, Patancheru, Andhra Pradesh.

Jodha, N S (1986): "Common Property Resources and Rural Poor in Dry Region of India", *Economic & Political Weekly*, 21(27).

– (1992): "Common Property Resources: A Missing Dimension of Development Strategies". World Bank Discussion Paper 169, The World Bank, Washington DC.

– (1995): "Common Property Resources and the Environmental Context: Role of Biophysical versus Social Stresses", *Economic & Political Weekly*, 30(51): 3278-83.

– (2008a): "Some Places Again: A "Restricted" Revisit to Dry Regions of India" in R Ghate, N S Jodha, and P Mukhopadhyay (ed.), *Promise, Trust and Evolution: Managing the Commons of South Asia* (Oxford: Oxford University Press).

– (2008b): "Rural Commons and Livelihood Strategies in Dry Regions of India", *The European Journal of Development Research*, 20(4): 597-611.

– (2010): "South Asia's Commons Are Weakening", *Himal Southasian*, special issue (Kathmandu), October-December.

Jodha, N S, N P Singh and M C S Bantilan (2010): "Enhancing Farmers' Adaptations to Climate Change in Arid and Semi-Arid Agriculture in India: Evidence from Indigenous Practices", Working Paper, ICRISAT, Patancheru, Andhra Pradesh.

Syamsundar, P (2008): "Decentralisation, Devolution and Collective Action: A Review of International Experience" in R Ghate, N S Jodha and P Mukhopadhyay (ed.), *Promise, Trust and Evolution: Managing the Commons of South Asia* (Oxford: Oxford University Press).