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Sustainability: The Community Level Indicators and Their Research and Policy Implications

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INTRODUCTION

An important feature of sustainability work in the recent years is the widening gap between the conceptualization and the operationalization of the phenomenon. This is because the dominant perspectives of sustainability work are intellectually oriented. These perspectives tend to bypass the concerns and perceptions of the people/communities, who are both the alleged culprits of promoting unsustainability and direct victims of its consequences. We believe that understanding and incorporation of community concerns and perceptions can add to the relevance and increased usability of sustainability work.

The recognition and utilization of the people's approaches and concerns towards sustainability are obstructed by their high degree of invisibility. Three important factors contributing to this invisibility are:

- (a) the lack of mechanisms on the part of the people to communicate what they feel rather than what researchers want to know.
- (b) the background, orientation and training-induced inability of researchers and others to understand people's decisions and actions with regard to sustainability.
- (c) the misapplication of people's economic behavior, represented by a "short planning horizon." This heavy discounting of the future puts "sustainability" (a futuristic phe-

nomenon) far beyond the realm of a common man's thinking.

The factors (a) and (b) are removable disabilities to which this paper is addressed. The factor (c) is a conceptual fallacy, where the individual's behavior is made to represent the social behavior or a social process.

Long-term survival, growth, welfare, and sustainability are concerns addressed collectively in the form of activity patterns and processes evolved over time (as in the case of traditional societies) or established by formal, legal, fiscal and administrative mechanisms in present day societies. The individual's activities, even when they are conducted within short-time horizon, have to be compatible with, and contributory to, the long-term sustainability process.

MANIFESTATION OF COMMUNITY APPROACHES/CONCERNS TOWARDS SUSTAINABILITY

To understand the community's (common man's) concerns for sustainability it is necessary to describe sustainability first. The simplest way to describe sustainability is to couch the whole phenomenon in terms of options (quality and range of production-welfare options) and their undiminished availability inter-and/intra-generationally. This perspective is related to seeing sustainability more both as a process rather than as a consequence. Process implies that prac-

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tices and measures are directed to the protection and enhancement of production and welfare options without resource depletion. As a consequence of this process, production and welfare options are available.

Viewed from the process angle, the traditional resource management practices of folk agronomy, ethno-engineering and collective social arrangements reflect a community's approach and concerns for sustainability or option maintenance/enhancement while protecting the resource base. Key features of these arrangements include diversification, flexibility, recycling, collective sharing arrangements and management of demand pressure on resources (Jodha, 1993). These, and similar practices are oriented to resource regeneration/protection while helping to production activities to provide an overall operational framework and direction for individual's decisions and actions within a short-time horizon. In this way, sustainability norms (evolved through trials and errors over time) have been codified in adaptation practices. While conducting their short-term activities, according to the well adapted mechanisms, individuals contributed to sustainability processes without explicitly thinking about these processes. By using these practices, they could maintain or enhance current options without reducing their scope for the future.

Decline of Processes

A rapid change in the demographic, institutional, economic and technological situation has made these traditional practices less feasible and less effective. The changed circumstances are less favorable to traditional forms of diversification, flexibility, recycling, collective sharing, etc. Consequently, the sustainability-promoting adaptations are rapidly eroding without any effec-

tive alternative arrangements being available.

Local communities are unable to evolve alternatives to suit the changed situations, as they did in the past, because the lead time available for trial and errors is drastically reduced in the face of rapidly changing circumstances and mounting pressures to fulfill immediate needs. Furthermore, opportunities for developing effective adaptations are severely curtailed due to the reduced social cohesion of the communities, marginalization of social sanctions and traditional wisdom, and the loss of community control over its own resources and their usage systems. These changes have been caused primarily by market forces, state interventions and the growth of individualistic tendencies in populations.

Missing Alternatives

While the state (and its agencies including those engaged in research and development policy and program formulation, etc.) has slowly usurped the initiatives and activity mandates from the people they have, by and large, failed to offer sustainability-promoting processes to the communities. Their top down approach and insensitivity to the grass roots level realities are the well-known reasons for these failures. Moreover, in most cases these agencies have focused on short-term considerations (e.g., famine relief or agricultural technologies based on the use of high yielding varieties).

The collapse of the traditional sustainability-promoting processes and failures to have adequate alternatives have led to the emergence of unsustainability prospects. These unsustainability prospects are especially pronounced in the fragile and margi-

nal resource zones, to which this paper relates.

Emergence of unsustainability, as represented by prospects of reduced range and quality of production and welfare options without external subsidization, are visible in several areas. Identification and understanding of indicators of emerging unsustainability, and the incorporation of the concept of unsustainability, into sustainability work is one way to link community concerns with the mainstream sustainability debate and action. We can reflect on indicators of unsustainability at three levels as discussed below.

INDICATORS OF UNSUSTAINABILITY

Indicators of unsustainability, i.e., failures to maintain/enhance production and welfare options without depleting the resource potential or generating external dependency, can be seen through: objective circumstances reflecting changes in the community's behavior and attitudes as well as their approach to their own resource base and the health status of the resource base itself.

We may examine these quite inter-related indicators of unsustainability in three contexts, namely: changes in social attitudes; persistent negative trends relating to resource conditions, productivity and management practices; and individual or group concerns about their present and future.

These contexts of unsustainability are elaborated below.

Changes in Social Attitudes

The different objective circumstances manifested in people's behavior, attitudes

and perceptions, can be viewed as fundamental reflections of emerging unsustainability. Some of these indicators of unsustainability, relating to emerging health and natural resources usage patterns, are often camouflaged as public interventions for development and welfare. Policy makers in these situations should be alerted to the reality behind their achievements and their impact on target fulfillment. In the context of the options maintenance/enhancement-centered operational definition of sustainability, these indicators suggest a decline in the range and quality of options and the people's forced adjustments to this decline (i.e., accepting inferior alternatives).

Information in this paper relating to community behavior and community attitudes that reflect unsustainability, is based on the field studies and observations from mountain (hill) areas and from the dry tropics of South Asia.

Information on these aspects from the Himalayan countries represents a focused synthesis of what I have learned based on formal surveys, RRA (rapid rural appraisal) exercises, case histories, collaborative field activities and observations over a period of six years ending in 1993.

(a) **The community's (or the individual farmer's) acceptance of inferior production/consumption options (e.g., consumption of conventionally disregarded, low quality food, fodder or fuel items).** Examples of this acceptance of inferior fodder and fuel include the use of *vanmara* (*Eupatorium*) for fuel. This shrub from the middle hills of the Himalayan region formerly was rarely used. In the past, sesame stalks and pearl millet husks were considered as waste and left for decomposition. These residues are now used as fuel and

fodder, respectively, in several parts of India (e.g., in Rajasthan). Similarly, in hills and dry tropical areas, material from field clearing is now used for fodder and fuel purposes instead of being thrown away. In many dry villages of Maharashtra and Andhra Pradesh poor people have started using congress grass as a fodder. This grass is an annual weed which causes skin irritation and disease.

The consumption by people of disease affected, shrunken, light and tiny grains of sorghum, millet and other pulses is an example of the use of inferior food items. In the dry land villages of India, these inferior grains, which are separated in the process of threshing and winnowing, were traditionally discarded for human consumption and given to the birds. Now people collect them and consume these grains. As a result, structures made in the past for pooling waste-grain for use by birds have now been demolished.

(b) An intense degree of "desperation" in resource use, and production practices leading to over-extraction and degradation of the resource base. "Desperate" land use practices include planting annual crops (with or without terraces) on the slopes beyond 30°. This is done in several parts of the Himalayan region, despite full knowledge that this practice accentuates the soil erosion process and that the expected yields from such cropping will be low. Another example, taken from areas of Rajasthan, is the extensive cropping of sand dunes, which results in dune destabilization and the movement of sand to neighboring fertile patches of land. A further example is the lopping of premature trees for fuel and fodder to the extent that their growth is stunted. A new phenomenon, manifesting high degree of desperation, has been observ-

ed in India during the drought periods in dry areas. This practice involves digging the roots of trees and shrubs for fuel, which permanently abolishes the source of fuel and fodder. Collecting food items from common property lands (e.g., village forest) soon after the seed formation and much before the product ripens is another example of desperate actions taken for survival. For example, in parts of Madhya Pradesh and Gujarat, honey gathering is done much before the appropriate time.

The practices listed above represent violations of all the norms of nature associated with higher and sustainable resource use. These actions are undertaken as very desperate people try to at least partially fulfill their immediate needs. Previously, violators of collective norms guiding the use of community resources were identified and punished. Now, regulations are no longer enforced due to the large number of people violating these norms.

(c) Acceptance of external dependency as a normal basis of survival (e.g., closely linking the conduct of normal production and consumption activities to availability of subsidies and charity). Examples of dependency on subsidies and charity include the dependency of farmers in dry and mountain regions on subsidized supplies of seeds and other inputs from the government. Traditionally, these farmers practiced seed selection, storage and mutual exchange of seeds. Similarly, maintenance and repair of collective assets, including village water tanks, the village hall, community grazing lands, or village temples, now are dependent on the receipt of government grants rather than based on collective self help. Drought relief and subsidized food from public distribution systems (as against self help) have become important parts of the com-

munity's pleading with the government for help. Communities in various areas feel it a matter of great achievement if they are able to get free resources from the state for any purpose. This is in contrast with the past (even 40 years ago), when dependence on charity (or even borrowing) was considered a sign of incompetence and disability of a person and their household and people avoided marital alliances with such families.

(d) Loss of resilience or the capacity to face shocks (e.g., the decline of collective sharing systems to effectively face the impact of drought, flood and other disasters without external relief). Related to the dependence on subsidy and charity is the collapse of collective arrangements and group action to meet environmental risks and undertake activities involving collective responsibilities, including providing help to the needy. Group responsibilities are replaced by individual efforts, as the former are too altruistic for the people so desperate to meet their current needs. The decline of traditional forms of group action for common property resource management and for upgrading local resources are other manifestations of this trend. In the ultimate analysis this loss of resilience amounts to the loss of the community's capacity to function collectively and perform specific functions.

What has been stated represents a loss of people's will, values and capacities to live with self confidence, self-help and collective effort. This is a loss of "social capital", on which social sustainability depends.

Health and Usage of Resource Base

The unsustainability trends related to the resource base and production processes of a system are manifested through:

(a) Loss of "systematic integrity," implying the disappearance or weakening of resource-regenerative, resource-protective mechanisms or the non-functioning of linkages between different components of a system. "Systematic integrity" means there are effective and reinforcing linkages between different components of a system as an organic entity. Farming-forestry linkages that facilitate nutrient cycling and sustained productivity of mountain agriculture is one example. Crop-livestock based mixed farming, mountain inter-cropping of cereals and legumes and the use of specific crop combination and rotation sequences in mountain and dry tropical agriculture are other examples. These practices facilitate the energy and material flows of nature in a specific ecological context. Discarding such practices under the pressure of short term needs implies a weakening of the organic integrity of a production system. And the breakdown of such integrative linkages between key components of a farming system means the emergence of unsustainability. The decline of diversified farming systems or resource use systems resulting in the breakdown of "systematic integrity" has been extensively documented by different researchers (Jodha, 1991).

(b) Ever-increasing (biochemical, economic) subsidization of the production processes to maintain the same or even lower levels of performance (e.g., different forms of external subsidies to production, consumption activities). A production system's crucial dependence on biological, chemical, and economic subsidies for its stability and productivity is more a symptom of unsustainability of a system than a sign of progress. Maintaining the level of crop yield through an ever-increasing use of external inputs (e.g., fertilizer) is a case in point. This trend is

nowhere more visible than in several areas covered by the "green revolution" where crop yields are maintained increasingly through a variety of subsidies.

(c) Marginalization, decline, and disappearance of the system or its components due to the loss of its identity, or its substitution by other component. A prime example of the loss of system identity and efficiency is the replacement of land-use extensive, mixed farming systems by land-use intensive, high input technologies. The increasing unfeasibility of slash and burn (shifting cultivation) in the eastern Himalayas and crop-bush fallow rotation systems in the arid-semi arid parts of India are concrete examples of this trend.

(d) Loss of recoument capacities of the resource base. Loss of recoument is, for example, reflected in the failure of rangelands to recover following droughts or the degradation of community forests or village pastures to the extent that it prevents their natural regeneration. Another manifestation of reduced recoument capacity of production resources is the failure to replenish soil fertility lost due to the continuous cropping of cereals. Failure to provide rotations with legumes or periodic resting of the land may lead to permanent nutrient deficits or imbalances. In general, the high demand pressure on natural resources combined with people's resource extractive practices contribute to the loss of regenerative/ recoument capacities of the resources.

In more concrete forms, the above changes are manifested through persistent negative trends in different variables. These verifiable or measurable negative changes (with varying degrees of visibility), are

described as indicators of unsustainability and are discussed below:

Persistent Negative Trends

Persistent negative trends reflect the emergence of unsustainability, including reduced range and quality of options and are often concrete and more observable, verifiable, and in some cases, measurable. Some of these negative trends are integral parts of the unsustainability-inducing processes initiated by policy and research and development interventions. Examples include the discouragement, by new technologies, of crop diversification, land-use flexibility, collective sharing, and resource recycling. Other indicators of negative changes include the consequences of these processes.

However, our focus should be more on processes, since processes offer the entry points for policy makers to understand and incorporate community level indicators in their development framework. As illustrated by Table 1, these indicators of unsustainability relate to:

(a) resource base (e.g., decline of groundwater table or reduced extent of agro biodiversity);

(b) resource productivity (e.g., persistent decline in crop yields as well as in production of biomass);

(c) resource management/production practices (e.g., disappearance of various forms of diversification, facilitating resource regeneration; disappearance of institutional arrangements to enforce resource conservation measures).

Table 1: Negative Changes as Indicators of the Unsustainability of Agriculture in Dry Tropical Areas.¹

Changes Related to: ^b	
Visibility of Change	Resource Base
Directly visible changes	<p>Various forms of resource degradation: emergence of salinity, coverage of fertile soil by shifting sands, vanishing topsoils due to water/wind erosion; deepening of water tables, groundwater salinization; emerging plantlessness, reduced perennials, increase in inferior annuals and thorny bushes; reduced per capita availability of productive resources.</p>
Changes concealed by responses to negative changes.	<p>Substitution of cattle, camels, by small ruminants; increased emphasis on mechanization of cultivation and water lifting; reduced resting of land; large-scale reclamation (!) of wastelands; shift from local to external inputs (e.g., from manure to chemical fertilizers, wooden tire to rubber tires for bullock carts).^c</p>
Development initiatives etc. - with potentially negative changes ^d	<p>R&D focus on: crops rather than on resources; technique rather than user - perspective (e.g., method/species/inputs rather than group action for watershed/range development); resource-upgrading ignoring its limitations (e.g., irrigation in impeded drainage areas); inducing high use intensity of erodible soils, and other resource-extractive measures (e.g., tractorization).</p>
	<p>Production Flows</p> <p>Reduced total and per capita biomass availability; reduced average productivity of different crops, increased cropping on sub-marginal lands; reduced input product recycling; higher dependence on inferior options, (e.g., harvesting/lopping premature trees), rising severity of successive drought - impacts; increased dependence on public relief, increased migration.</p> <p>Higher coverage by public distribution system (food, inputs) and other anti-poverty programs^e; reduced reliance on self-provisioning system and greater dependence on external market sources; changes in land-use pattern favoring grain production.</p>
	<p>Resource Use/Management Practices</p> <p>Changes in land use pattern: cropping on sub-marginal lands; decline in common property resources; reduced diversity of agriculture (e.g., number of crops/enterprise and their inter-linkages); reduced feasibility and effectiveness of traditional adaptation strategies (e.g., rotations, inter-cropping, biomass strategies).</p> <p>Discarding of minor crops, shift towards monocropping with standardization inputs/practices; increased land-use intensity; shift from two oxen to one ox plough; tractorization^f; replacement of self-help systems by public support systems.</p> <p>Sectoral focus of R&D and other support systems ignoring flexibility and diversification needs; privatization of common property resources; extension of generalized external approaches to specific areas: disregard of folk knowledge in formal interventions; replacing local informal arrangements by rigid legal/administrative measures.</p>

^a Source: Table adapted from Jodha 1991. Based on synthesis of evidence and inferences from Jodha (1986a, b, 1989a, b, 1990b), Jodha et al. (1988), Jodha and Singh (1990), Whittaker et al. (1991).

^b Most of the changes are interrelated and they could fit into more than one block.

^c Since a number of changes could be for reasons other than unsustainability, a fuller understanding of the underlying circumstances of a change will be necessary.

^d Changes under this category differ from the ones under the above two categories, in the sense that they are yet to take place, and their potential emergence can be understood by examining the involved resource-use practices (i.e., processes) in relation to the specific characteristics of the resource base of the area.

The author has put together more than two dozen indicators for dry tropical and mountain areas (Jodha, 1991). Some indicators for fragile resource zones are summarized in Tables 1 and 2.

While some negative changes, such as yield declines and increased salinity of groundwater and soil, are clearly visible, others are concealed by human responses to these negative changes. Processes that conceal negative changes include substitution of shallow-rooted crops for deep-rooted crops due to erosion of topsoil and the increased dependence on chemical fertilizers, following the reduced regeneration of organic matter as a result of decline in farming-forestry-livestock linkages. Alternatively, some of these changes are visible at the macro-level while others are visible only at the micro-level.

It will be noted that some indicators of unsustainability represent the process of negative change while others are the negative consequences of change. For instance, the decline of diversification and resource-regenerative practices is a "process type" of indicator while the decline in productivity following these changes is a "consequence type" of indicator.

Community concerns and expectations

Community-level indicators of sustainability or unsustainability relate to people's concerns, desires, expectations, frustrations, and hopes as reflected by their decisions, actions, and expressed views as individuals or as groups. Some of these concerns converge with the objective circumstances (indicators of unsustainability) discussed above and offer a subjective interpretation of these circumstances. But more importantly,

these concerns represent an assessment of the current situation and future possibilities by people both as individual participants in the process of change and as members of groups affected by the process of change.

The real value of this qualitative information on community level indicators of unsustainability and the people's strategies against unsustainability lies in an understanding of the whole dynamics of change processes affecting sustainability and unsustainability. For policy and research managers, this information may reveal both hitherto unrecognized signals of danger as well as alternative approaches to manage unsustainability. Table 3, based on information developed for the World Resource Institute's Project 2050 (Jodha, 1993) provides an example of how people's information can be integrated with policy information.

SUMMARY

This paper illustrated, in different ways, the emerging prospects of unsustainability in the fragile resource zones such as Himalayan region and dry tropical regions of India. The indicators of unsustainability, including reduced range and quality of production, welfare options without external support, were discussed in different inter-related contexts. Their policy implications were also identified. The key message of this paper was to incorporate these community level indicators to enhance relevance and usability of sustainability promoting efforts. (Jodha, 1993, 1991; Nigel et al.)

Table 2: Negative Changes as Indicators of the Unsustainability of Mountain Agriculture.^a

Changes Related to: ^b			
Visibility of Change	Resource Base	Production Flows	Resource Use/Management Practices
Directly visible changes	Increased landslides and other forms of land degradation; abandoned terraces; per capita reduced availability and fragmentation of land; deforestation, changed botanical composition of forest/pasture. Reduced waterflows for irrigation, domestic uses, and grinding mills.	Prolonged negative trend in yields of crops, livestock, etc.; increased input need per unit of production; increased time and distance involved in food, fodder, fuel gathering; reduced capacity and period of grinding/saw mills operated on water flow; lower per capita availability of agricultural products, etc.	Reduced extent of: fallowing, crop rotation, intercropping, diversified resource management practices; extension of plough to steep slopes; replacement of social sanctions for resource use by legal measures; unbalanced and high intensity of input use with subsidi- zation.
Changes concealed by responses to changes	Substitution of: cattle by sheep/goat; deep rooted crops by shallow rooted ones; shift to non-local inputs. Substitution of water flow by fossil fuel for grinding mills; manure by chemical fertilizers. ^c	Increased seasonal migration; introduction of externally supported public distribution systems (food, inputs); intensive cash cropping on limited areas, reduced availability of season- ally, spatially diversified products. ^c	Shifts in cropping pattern and composition of livestock; reduced diversity, increased specialization in monocrop- ping; promotion of policies/programs with successful record outside, without local evaluation. ^c
Development initiatives etc. - with potentially negative changes. ^d	New systems without linkages to other diversified activities and regenerative processes; generating excessive dependence on outside resource (Fertilizer/ pesticide based technologies, subsidies), ignoring traditional adaptation experiences (new irrigation structure); programs focused mainly on high resource use-intensity, resource extraction.	Agricultural measures directed to short term quick results; primarily product (as against resource) centered ap- proaches to development; sectoral focus, narrow specialization (e.g., horticulture); high dependence on sub- sidies, development activities focused on limited products ignoring diversity.	Indifference of program and policies to mountain specificities (fragility, diver- sity, etc.); focus on short term gains; high centralization; excessive, crucial dependence on external advice ignoring traditional systems; generating perma- nent dependencies.

^a Source: Table adapted from Jodha 1991. Based on synthesis of evidence and inferences from Jodha (1990), Shrestha (1992), Singh (1992), Shutain and Chunru (1989), Hussain and Erenstein (1992), Bajracharya (1992).

^b Most of the changes are interrelated and they could fit into more than one block.

^c Since a number of changes could be for reasons other than unsustainability, a fuller understanding of the underlying circumstances of a change will be necessary.

^d Changes under this category differ from the ones under the above two categories, in the sense that they are yet to take place, and their potential emergence can be understood by examining the involved resource-use practices (i.e., processes) in relation to the specific mountain characteristics.

Table 3: People's Concerns and Responses to Unsustainability Prospects.

Concern 1. Rapidly shrinking resource base:

Declining Extent	Causes and Processes	Negative Responses	Limited Positive Responses	Policy and Research Implications
a. Per capita land holding; b. Access and availability of common property resources (CPRs); c. Soil fertility and resource productivity; d. Access to seasonally spatially diversified production opportunities.	a. Increased family size and land fragmentation; reduced migration possibilities, limited off-hand activities; b. State policies and market forces encouraging privatization, decline of group action/collective sharing systems, rapid growth human/animal population; c. Erosion of top soil, reduced availability of organic matter (dung, litter), reduced extent of fallowing, crop rotation, inter cropping, recycling, diversification and regenerative practices; d. Decline of common property resources (CPRs) and collective sharing systems, reduced extent of diversification involving inter-linked land uses as encouraged by market forces, state subsidies and new technologies.	a. Reduced extent of fallowing the land, overcropping of exhausted land, cropping on sub-marginal (steep slope) lands, substituting crops for natural vegetation, discarding traditional slow-impacting resource conservation/regenerative practices; b. Disregard of CPRs, grabbing CPRs as private property resource if possible, over exploit residual CPRs; c. Shift to low fertility requiring crops, shallow rooted crops with low productivity; increasing use and dependence on external, subsidized inputs (e.g., fertilizer); d. Forced reconciliation with reduced diversified opportunities, depend on opportunities as permitted/generated by market, new infrastructure and public supplies.	a. Focus on and skill acquisition for off-farm activities, land-use intensification using high value crops, resource-upgrading through irrigation inputs; b. Focus on activities with the lowest dependency on unworkable group action, revival of group action through user groups for forest, pasture, irrigation; c. Revival of biomass centered diversification, including agro-forestry, production of organic matter; d. Initiation of farm level diversification and market-induced linkages; focus on income generation rather than on diversified physical production.	a. Promotion of off-farm activities through skill generation and infra-structural support focused on harnessing of local resources and comparative advantages; development of technologies farming diversification, resource regeneration, recycling and harnessing of local 'niche,' technologies focused on biomass stability and agro-processing; b. Pro-active CPR policies; restoration of effective community control on CPRs; encouragement to user groups; technologies promoting/harnessing of CPR-PPR complementarities. c. Technologies promoting diversification and fertility management, biomass productivity and recycling, resource conservation/regeneration technologies usable without group involvement; learning from the rationale of traditional practices.

Table 3: People's Concerns and Responses to Unsustainability Prospects. (Continued)

Concern 2: Falling production and shortages of supplies:

Declining Extent	Causes and Processes	Negative Responses	Limited Positive Responses	Policy and Research Implications
<p>a. Increased scarcity and instability of local products;</p> <p>b. Reduced availability of food, fodder, fuel and number and variety of products and increased dependency on external subsidized supplies.</p>	<p>a. Decline of crop/biomass/animal productivity due to emerging imbalances in resource use, resource degradation; shift of prime lands to limited high value crops;</p> <p>b. Reduced diversification of land use and cropping systems; decline of CPRs and collective sharing systems.</p>	<p>a. Increased use of traditionally discarded inferior products; over extraction of land and vegetative resources to meet current needs; increased dependence on external supplies and subsidies (public distribution system);</p>	<p>a. Dependence on farm level in place of village level diversification, revival of agro-forestry, complementary use of subsistence and high value crops.</p>	<p>a. Policy and research focus on locally appropriate diversification strategy; promotion to spontaneously emerging tendencies in resource management indicated by revival of agro-forestry, user groups.</p>

Concern 3: Reduced dependability of traditional technologies and institutional arrangements:

<p>a. Folk-agronomic practices less feasible and less effective;</p> <p>b. Institutional arrangement, collective sharing, group action supporting resource management marginalized, made effective.</p>	<p>a. Reduced land holding obstructing land-extensive traditional practices; stable but low productivity and slower impacts make traditional practices less attractive, erosion of essential group actions for resource management; backlash of subsidized new technologies and their impressive impact in the short-term context.</p> <p>b. Imposition of formal legal, fiscal, administrative arrangements from above making traditional institutional arrangements ineffective.</p>	<p>a. Slowly discarding the traditional measures; adopting new technological measures with state subsidy; increasing demands for more and more state patronage and subsidies; combining traditional and modern technologies as possible;</p> <p>b. Switching over to new arrangements and alignments in place of participatory traditional arrangements; dependent on individual-centered strategies/approaches in place of group action;</p>	<p>a. Participation in transformation processes involving new technologies and new institutional support systems; integration of modern and traditional technologies, as appropriate, revival of task specific group action.</p>	<p>a. Recognition and utilization of rationale of traditional practices in designing new technologies and policies; bottom up and participatory development approaches, greater sensitivity to people's concerns in development intervention, community capacity building and local resource control</p>
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