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**Eco-Sociology of Household Risk Adjustments and Commons
: Performance in an uncertain world**

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The search for ethically **responsible** and **scientifically precise** alternatives for socially disadvantaged groups in high risk environment requires a multi disciplinary, multi market/multi institutional approach. Various groups of rural households diversify portfolios of their economic enterprises within a range defined by the ecological endowments. The access to factor and product markets, kinship networks, intra and inter household risk adjustments, public and private relief systems and finally common property resources or common pool institutions determines the composition and evolution of portfolios of different enterprises (Gupta, 1981, 1984,1985). There have been some studies on the role of commons in risk adjustment vis-a-vis private and open access resources (Gupta 1982 , 1985 , McKean 1985, Biswajit 1983, Jodha 1985, Agarwal 1990 ,Gupta and Ura 1990, Braden 1985, Buzdar ,1988 etc.). A coherent theoretical framework however, remains to be developed .

The Austrian School has rightly questioned the dilemma of pricing resources according to equilibrium outcome or utility consideration (Buchanan ,1982), Human decisions are considered to be spontaneous, creative and

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and dynamically subjective (Kirzner 1982) . The theory of Chaos provides a way of dealing with apparent randomness in the behavior of natural and social phenomena by looking for the order at different levels. A world view in which synchronization or simultaneity rather than sequential or causal chain reaction explains human choices is characteristic of eastern societies (Peat, 1987) . The search for sustainable development by definition was pursued along very different criteria in societies that have a history of thousand of years compared to say America or other European societies which, may have much shorter history .

Sustainability of using natural resources in an uncertain world in which disadvantaged households may have control over very few institutions, requires understanding of cultural boundaries of consciousness . The understanding of emic rules over etic rules requires distinguishing cultural and value codes . Tolerance of good turns with bad ones sometimes in a random order has become an integral part of survival ethic in peasant societies. Study of institutions that generated this ethic becomes a necessary part of understanding the portfolio adjustments under risk and uncertainty .

Management of risks is sometimes like a game of musical chair or snake and ladder (Gupta, 1987). Randomization to deal with uncertainties , as we shall see later, has been an ancient way of dealing with the problem of sustainable resource use . Infact there are examples where certain tribes converted a problem of risk into uncertainty just in order to use the rule of randomization in resources use and there by prevent excessive exploitation of the natural resource. But, these patterns emerged not just in the parameters of evaluating and managing resources but also in determining the outcome of

playful performance (Richards 1989). The adjustment with risks , the contention here is , does not require meeting just the needs of survival taut also of fun , liveliness and synchronicity (i.e. doing things together irrespective of What and why) .

Performance of a music concert or a drama requires a coordinated simultaneous act with the message being always different though the concern, pedagogy and instrumentalities remain same or similar.

The rules of performance can not be derived by aggregating the rules of drama or music . These rules can be understood by look-ing at the basket of preferences (ranging from aesthetic ,spritu-al to material and political) that social groups have. Thus same performance need not click with all types of audiences. A technically imperfect musical performance may some time leave a more lasting impression on the audience than a technically perfect performance but unable to move the audience.

How does this metaphor help us in seeing the working of social institutions in action in high risk environments? . In case of Bhutan , a Buddhist society , a butcher (of game and domestic animals) and a consumer (compelled by the environmental compulsions of say a mountain region) become part of the same moral persona and enact a role which by any other logic is difficult to comprehend . The killer of animals is held in lower esteem but not the eater. The killing is still a taboo. We thus begin to see the way performance of normative roles without generating guilt generates a logic of day to day living. Conservation ethic is quite compatible with such 'corridors' of convenience . Pursuit of rationality from narrow economic per-spective often masks the overlapping layers of consciousness held in common by the peasant societies.

We provide a discussion on risk, resources , skills , rights and collective responsibility in part one of the paper. .

We draw upon the eco-sociological frame work for analysing the household adjustment with risks and the role played by commons in it in second part . We also look at the interactions between the access , assurances, abilities and attitudes with ecological resources , institutions , technology and culture in an eco-insti-tutional frame work. This provides two levels of analysis of household choices,vis-a-vis resources managed under different property regimes.

One, the interaction of access to and assurances from com-mons vis-a-vis resources under private, open access and public control .

Second, the analysis of rules, rituals and rational order is attempted in the context of randomization and/or portfolio adjustments over, space, time and sector.

The theory of playful portfolios to deal with risks and commons implies a multi level, multi market and multi institutional analysis of the household choices. The purpose, it is suggested, is not to understand in a reductionist frame work how the rules and roles of different actors in a performance are obtained. Instead the purpose is to understand the playfulness that underlies human inventiveness while dealing with a performance in which a sum is not only more than the parts but is also distin-guishable from other sums of the same parts.

The policy implications are drawn not for generating prototype institutions for managing common property resources, but working towards a political order and Eco-institutional framework in which the order can only be seen at a

particular level of analysis by providing conditions conducive to playfulness. The limits of rationality defined by the causal chain mechanisms have to be recognised if order at a higher level of consciousness and social purpose of life has to be discovered in the holistic or organic worldview.

The paper emphasises need for departure from single resource, single institution, single level analysis (for multilevel analysis, also see Ostrom, Picht and Feeny 1988). The paper is organised in three parts. In part one a brief review of literature is presented to understand the relationship between risk, resources, skills, vis-a-vis private, public and common resource markets providing ingredients of individual and collective portfolios. In part two, we discuss the three level analysis of risks, adjustments, institutional emergence and portfolio diversification vis-a-vis common property institutions. In part three, we list the questions which need to be pursued further.

PART ONE

Risk, Resources, Skills, Rights and Collective Responsibility:

Many times we try to avoid risk in a system by taking recourse to redundancy i.e. providing safety margin . There is always a cost associated with this alternative . Studies using binomial analysis have shown that risk and redundancy are not inversely related linearly i.e. at all levels of redundancy For instance in air plane, Hudson (1981) shows that five engines are not

always safer than three engines. Institutional analysis has not taken into account the relationship between risk and redundancy.

Hudson (1981) decries the tendencies of solving problems by adding new system components which may themselves be prone to failure. The same additional resource can cause greater risk in some cases and adds security in other cases depending upon the probability of failure of each component, number of components and proportion of the number of the components which are needed to run the system .

Gardener (1985) recalled the confession by Buchanan (1982) that there are aspects of human action that cannot be subjected to explanation in an operationally meaningful theory of economics.

The creative and spontaneous networks (Gupta 1984, Box 1989, Richards 1985) are means for obtaining information, resources, incentives for dealing with risks singly or jointly in different resource markets. Guillet (1981) compares the investment portfolio of peasants with that of professionals like us. The portfolio dimensions brings in the complexity but also a greater order in the perspective on household survival under risk by manipulating access to private and public common resources.

Reviewing lessons from various attempts to manage risks, Clark(1980) observed that uncertainty or variability in the natural system was initially seen as a source of risk/hazard. Without exception assumption was that removal of variability would be an unmitigated good such that risk would be reduced and performance improved. However, the experience showed,

the decreased frequency of variation in the system was accompanied by increased vulnerability to and cost of variation when it finally broke loose from managerial controls.

The management efforts had changed the kinds of risks encountered, but not the fact of risk. More often than not, management shifted the risk structure from a sort people were accustomed to dealing with to one they had never before experienced. (1980:7)

He underlines that merely an increase in knowledge or control is unlikely to reduce unpleasant surprises in resource management. He suggests need for learning to design such resource management system that can better cope with failure guaranteed by our ignorance and inherent variability of resource of systems. The suggestion for uncertainty tolerant management system is similar to what Weick (1987) called self designing system.

Clark observes:

If knowledge is incomplete, if the future is uncertain, then mistakes and surprise are inevitable. The categorical imperative is to recognize such mistakes, to learn from them, and to modify future actions accordingly (1980:13).

The retrospective rationality is after all not all that bad. It helps us generate psychological satisfaction in the wake of material dissatisfaction.

Breaden (1985) recognises that individuals when are dependent upon others for using a resource do look for assurances about others' behaviour. The restraint, he adds,

will be exercised voluntarily only if the future is not discounted so heavily that the short term gains of defection outweigh long term gains possible from conditional cooperation by a critical mass of participants.

A positive prospect that others may reciprocate provides a favourable incentive for voluntary restraint, but these fall rapidly as the number of participants increases or discount rate increases.

The studies on collective behaviour have emphasised primarily the variables which deal with either group size, monitoring, frequency of interactions, nature of reciprocity, the choice of discount rate, the extent of tolerance by the group of free riding, the ratio of return that an individual gets as a fraction of total group gain or loss, cost of preventing free riding vis-a-vis the losses due to free riding as a part of total group gain etc. However, most

of these interactions have been pursued primarily in a single resource market, say, fisheries, forestry or grazing, etc. While the need for multi level on multi market approach has been recognised (Ostrom, Picht and Feeny 1988) the framework still looks at the rules that cover behaviour in segmented re-source markets.

I have earlier shown that a common property resource may be managed better in a high risk environment not because it was needed less but because it might have provided only a small share of the total livelihood requirements of a sizeable group of the households (Gupta,1985) .

To illustrate let us assume there is a village having three groups of households. Group-one owns primarily cattle , land and receives income from inward remittances (from people employed elsewhere) . Group-two owns cattle and sheep , some land , family members are engaged in crop related activities and labour on others farm , public employment works etc. Group-three has primarily landless people or marginal producers having very small land holding if at all , owns primarily sheep , gets majority of the income from labour , also pursues crafts and lives in separate settlements outside the main village due to caste and other social factors.

The portfolio of activities of each group is different and so is different their respective vulnerability. The proportion of biomass they get from commons as a function of total biomass requirement will also vary. However, the attitude towards commons would not be judged merely by the access and the assurances available about future returns from present investment and others behaviour vis-a-vis one's own , or the skills or abilities of groups to

convert resources into investments . The attitude will also be governed by the timing of the availability of biomass from commons and difference between the threshold quantity of biomass necessary for survival during the lean period and the total biomass available from the commons during this period , The threshold value will be determined differently for different groups depending upon the availability of biomass from private or other open access resources.

The catchment area from which group one, two and three draw their biomass would also be different.



Catchment of Biomass for a pastoral community comprising three Groups

The group three would migrate to much longer distances than group one due to technological reasons (sheep dominant portfolios) and differential access to private resources. The domain from which they will draw the biomass may overlap partly. Thus group one and group three may supply restrained towards commons for very different reasons. In both the cases the critical resource availability over time may not be synchronized. In case of group three the vulnerability is high and therefore, dependence on a resource regime (in this case CPR) which provides only marginal share of requirement is low. In the first case the vulnerability is low and the dependence is also low. In case of group two the dependence may be somewhere in between.

Even though the environmental risk and uncertainty may be same for all the

three groups, their response to commons would be influenced by the importance that CPR has in their portfolio besides other background factors influencing their attitude and expectations.

In case of group one the inward remittances may reduce the vulnerability by providing a regular flow of income and thus change the bidding behaviour vis-a-vis commons. The cultural congruence between different groups would act as a background variable in so far as the critically of availability of biomass from CPR is concerned. In a drought year everybody may decide to be indifferent to the commons because the biomass may not meet more than a few days need of the three groups. Alternatively, group three and group two may migrate out leaving behind group one to use the CPR resources in the lean season. There is a possibility that group one may decide not to violate the sanctity of commons either because of religious reasons or respect for future availability of resource to the other groups as well as to the members of the same group. In either case there could be several variations in dealing with risks and institutions may emerge to regulate cultural, economic, psychological, and social expectations of people from each other within the groups as well between groups.

We have come across instances where village leaders may decide to auction the commons to the highest bidder even though there may be reservations for group three type of people belonging to lower caste. The argument may be that bid price offered by the group three would be very low and therefore collective income of the village would come down. In case the collective income is invested for such common properties which are used by everybody equitably, the inequity of the auction mechanism may be tolerated. On the other hand, if the common good created serves only some groups more than others there may be

resistance. The degree of resistance would of course vary depending upon the extent of inequity and intra-group solidarity. There are examples where experience of very strong conflict between groups one and three have led to the emergence of very high solidarity in group three for managing a group based common pool institution (Pastakia, 1990).

There are also examples where the group one dominating the local level panchayat (quasi legal administrative authority elected by village members) may hand over the commons to forest departments or other public authorities for its closure and the regeneration.

In the process group one ensures that group three would lose access to the CPR in the short term . When the resource regeneration has taken place, the usufruct may be disposed off in market. And the surplus so generated may be used for creating a public or common good in the village which may or may not be of much use to group three. The group three may lose access in the long term also. The group one and group two may collude because of economic and social reasons. In some cases on caste and cultural considerations group two may also align with group three. The commons may survive without necessarily any gain in the livelihoods prospect of the group three.

Risk and redundancy

We have argued that probability of an institution generating cooperative behaviour may depend upon, among others, atleast three factors: a) The proportion of value added by the institution invested in risk and guarantee funds , b) The proportion invested on diversification of use of common resource or value added product , and c) the extent of transfer pricing being

followed by the group members. It is obvious that further distribution of risk fund or diversified resources among various poolers would further influence the emergence of cooperative behavior (Gupta 1984,1985).The degree of redundancy generated may also influence, as mentioned earlier , the incentives for cooperation among various groups having different portfolios.

The redundant resource will insure the portfolios of different groups differently depending upon the importance of the redundant resources in the respective portfolios. The variability in returns from each enterprise in the portfolios of three groups would influence their incentives to economise the use of respective resource. Whether the returns from enterprise dependent upon commons say livestock , co vary or contra vary with the returns from other enterprises would influence the portfolio variance as distinct from enterprise variance . We have suggested that an enterprise may be discounted differently depending upon the property regime governing its use . Lesser the control over cash flows from an enterprise, higher may be the discount rate . Further, a negative return enterprise may be kept in the portfolio if its presence (a) reduces the portfolio variance by generating externality (as in case of manure for crops but which has no market value say in some hill areas or trees in some of the agroforestry systems), (b) meets certain cultural needs (some varieties of rice though with very low return are grown because they are required for certain rituals and religious occasions or an old cow is not culled due to religious taboo on cow slaughter) and (c) provides opportunity for renewing certain skills which otherwise may get lost or weakened .

The trade off between redundancy in resource use to deal with future uncertainties vis-a-vis optimal scarcity leading to emergence of rules for regulating present resource use has to be made very carefully. Too much of

redundancy may confuse and too little may cripple (Guptal985). Sometimes scarcity in resource use is compensated by redundancy in cultural or psychological sub set of. living. Some times the regulation of CPr is dfone through regulation of managing private resource. Gills and Gamtgard (1981) provided an example of regulating private resource to protect the commons. In other words scarcity in one sub system can influence sufficiency in other systems. In addition to redundancy, randomization has also been used for regulating collective behaviour for managing commons.

Risk , redundancy and randomization

In a paper on Musical Chairs, Snake and Ladder on Management of Risks, I asked a question as to why did children all over the world (particularly the developing world) play games that involve development of randomization skills. How did one contrast evolution of this skill in the process of evolving human consciousness in past with the trend towards development of strategic choice or only-one-best solution games in the developed world or metropolitan culture. Does it provide some clue to the increasing tendency of dealing with nature through control rather than coexistence spirit ? With the increase in individualization of risk assessment and response the collective choice options even if more sustainable seemed to have been ignored (assumption here is that collective choice would accommodate the use of randomization or other such rules to either constrain the use of resource or its distribution which is unlikely to be the case with individual rationality) . Legitimacy to this ignorance was provided by an ethics which justified the precedence of individual survival over collective survival as suggested in the dominant philosophy of triage.

MCKEAN (1985) provides an example from Japan where grass bundles were tied and allotted randomly to the people harvesting it from the commons so that no one tried to make too large a bundle for one's own use. Gupta and Ura (1990) found that in some mountain villages people drew the turn for getting water for irrigation from a mountain stream by drawing lotteries. Gerlach and Palmer (1981) provide an instance of a tribe in Africa which had a water point near a settlement. The tribe knew the time when the animals would come to drink the water. The rationale response in the short run might be to hunt the animals when they came for drinking water with the assumption that animals might not learn. And they may continue to come at the same time. Or even if animals learnt and started randomising their arrivals the tribe could fix turn of various members and kill the animals without much uncertainty. However, the tribe did not follow any of these alternatives. The leader of the tribe threw a stone tied to a sling after rotating it for a while. The tribe went for hunting in whichever direction the stone was thrown. This may even be just opposite to the direction where animals might be found much more. By randomising the search the extent of damage to the ecological system was minimised. And at the same time the group learned to live with heavy catch on some days with no catch on other days. The ethics of concern for ecological balance and cultural code generating happiness over failure due to fun and success due to gain was an important key to understand emergence of randomization as a rule for resource management in such contexts.

Strategic Diversification for Survival of Commons

Lest an impression is created that I am emphasizing the role of randomization over strategic resource planning under all conditions, let me state cases

where ecological conditions require strategic adjustments in resource use over space, sector and time.

Buzdar (1988) provides explanation of multi enterprise, multi resource or eco-niche based survival strategies. The interaction between private and common resources across altitudes in North Pakistan resembles the experience in Swiss Alpines (Netting 1972) and Bhutan (Gupta & Ura, 1990). The agricultural land and animals are owned in this case individually where as water and pastures are owned collectively. No single altitudinal level or eco-niche has the potential to provide the survival needs of the villagers. All families required access to different micro environments to reduce the risk of bad years and effectively schedule resource use over time and space. Just like single altitude level was not capable of providing survival needs, no single activity was sufficient either.

The bundle of rights emerged to manage properties under various regimes or rules. It has been shown that individual strand of this bundle may be distributed among state, owners, users, creditors, labourers etc. (Ciriacy-Wantrup 1963).

Buzdar provides examples of coordination among various pastoralists who must regulate the entry and exit in the village such that presence of the animals coincide with the fallowing of the fields. This in turn requires that individual cultivators grow crops which mature in the same time. The fines are imposed for keeping animals longer in the village or bringing them back early. Agarwal (1990) observed a similar practice in Bunakha village of Bhutan.

Cooperation and diversification

Bromley (1986) describes a matrix of positive reciprocity, altruism, freerider and negative reciprocity to explain incentives for cooperation in a group. However, the framework needs improvement to deal with multimarket multi institutional exchanges.

Questions have been raised about the factors which guaranteed that an institution once evolved continue to play the role of coordination, provision of information and determination of pooling and distribution rules (Biswajit 1983). Berkes (1985) argues that fisherman fish for money and not biomass. implying that their strategies for catching different fishes evolve in response to market demand for each specie . He could also have enriched the analysis by looking at the portfolios of fisherman going for high value low quantity species vis-a-vis low value high quantity species. The co-variance or contra-variance of quantity, value and risk involved in fisheries vis-a-vis other investment opportunities may have to be looked into to further understand the response to commons. McCay (1984) argues that they could also be a tragedy of commoners instead of just the commons. Smith (1984) asserted that CPRs were always accompanied by triage. While one may dispute this contention there is no doubt that equity proves to be elusive in the study of commons when one searches it in any one resource market. Perhaps organising inequity in different resource markets or systems provided a mechanism of balancing the respective portfolios. Thus, owners of livestock may use commons more than the land owners. The latter may use livestock dung as manure or fuel much more compared to the former. Shah and Ballabh (1986) have argued that in a group action stake of each member in the resource needs to be established. We would modify it to suggest that the stake should be

established in different resources. And these stakes need not follow same parameters or the rules in each resource market or system .

Sahlins (1974) had described how pooling and redistribution function could continue if some rent was extracted by the decision centre for performing this function. Something similar to what Berkes suggests as a rent for society in the form of royalty payment for fishing. The difference is that in the first case the rent accrues to individual or institution with large positive externality. In the second case the rent accrues to society through indirect taxation or direct taxation with small negative externality to individuals who pay the rent.

While studying collective action in traditional village societies, Little (1988) observed that the "patterns of ongoing reciprocity, shared values, and in-process sanctions and rewards may effectively and stably off set freerider tendency within the traditional village and permit the village to secure collective goods which would not be possible in atomized and anomic society". Perhaps one could add that even in an atomized village with some of the traditional values intact, freerider problem can be solved if generalised reciprocities dominate over the specific ones as they do in some of the mountain and desert villages in addition to other places.

The problem of 'organizing inequity' to generate generalised reciprocity can also be seen from another dimension. Diekmann (1986) found that it was difficult to explain actual choices of people by same decision principle. However, strong negative effect of group size on cooperative action was noticed. Perhaps the lineage or kinship groups help in drawing the boundary of consciousness smaller than any other boundary be it of caste or class.

Thus if one organised equity within the subgroup tolerating inequity between groups or sub groups, there may be a possibility for explaining cooperative action in multi resource, multi skill communities.

Rung (1985) drawing upon the work of Amartya Sen (1967, 1969, 1977) suggests that free riding was an option but not an imperative in collective choice situations. Particularly if institutions provided opportunities of learning overtime, and gaining order and security in an uncertain world by providing assurances. The assurance problem was seen as a zone of possibility.

Brubaker (1973) suggested a golden rule of revelation. It implies, "thus it is not the desire to ride free at the expense of the group, but wish to be assured that the others will make an appropriate contribution that may constitute motivation 1973: 152). Perhaps in eastern societies the deference to others whose opinions may be given more weightage than their action may generate a similar search for assurance. There may be a bit of free rider and golden revelation in each individual though the relative share may vary.

In the institutions based on the golden rule of revelation there may be under allocation of resource due to free riding. On the other hand in the institutions based on apparatus of collective compulsion there may be forced riding by individuals who are coerced into expressing non existent demand for collected good. A good may be bad, in some cases from which it is economically not feasible for an individual to exclude himself and for which compulsion may be appropriate. Two insights this dimension offers are:

- (1) the potential and actual demand for different resources needs to be taken into account while analysing the incentives for cooperative action, and
- (2) the rules that may coordinate behaviour of groups will vary over size, sector, space and time. The dynamism of this variance may be difficult to

capture, we submit once again, if institutional rules referred here pertain to anyone resource such as land, labour, water, etc.

Study of natural laws helps in understanding the correspondence between the ecological imperatives and social motivations. For instance, in Andes it was found that most indigenous fruits were available during rainy season (November to March) such that the dispersal of seeds would take place when water was available (Tillman, 1987). There are umpteen examples of such correspondence between the need for a resource to regenerate and evolution of social customs, resource use patterns which are collectively and individually in conformity with ecological requirements of sustainable resources. There are tribes who do not fish during the period of spawning. Further, high germ plasm variability in some of the regions having highest degree of poverty generated a cultural requirement for different types of varieties say rice or potato and tolerance of low level of returns with high variability in different varieties. The survival was ensured because there existed a contra variance in returns of different local varieties. Thus, some output was available no matter whether rainfall was too little or too much. But with declining demand for the skills of such communities or inappropriate rewards for maintaining bio-diversity, the income levels of people have declined. Once the portfolio shifts took place in favour of uniform varieties or some other enterprises, the cultural edifice supporting respect for sustainability through diversity crumbles down.

Some other ways in which the traditional societies try to manage correspondence between common and private resources are : establishing correlations between one system and another (to use proxy variables like flowering of certain shrubs or grasses to regulate decisions about beginning or

ending grazing activity at a given place), generating rituals requiring respect for common properties, instituting customs or festivals which serve as reminders of individual responsibility for a collective good etc. Much of the literature on institution some how has ignored the rich tradition of cultural mechanisms available for management of commons. Stocks (1987) provides examples of cultural norms that counteract irrational tendencies of resource use. For instance, a pastoral group could evolve norms of spending most time on patches with highest rate of return or evolve norms of mobility even if resource supply did not warrant it.

Summarising discussion in this section, we note that environmental risks are adjusted by various social groups through a combination of strategies that vary over space season, sector and social groups. We also observe that the patterns of diversification are evolved over a long period of time through trial and error and not necessarily only with the economic ends in view. The act of performing sometime is its own reward. Or to put in other words travelling together in a journey is given as much importance by the eastern societies if not more as reaching the goal. The performance orientation provides the basis or order in seemingly chaotic conditions of individual choice.

The coordination of individual choices through evolution of portfolios requires (a) understanding of risk and returns in each resource market, (b) evaluation of the returns by skills which are calibrated differently for assessing short and long term economic and social, and individual and collective returns and (c) differential discounting of returns in times of crisis or scarcity vis-a-vis returns in normal times. The spirit of innovation supported by knowledge richness of disadvantaged groups provides

better understanding of the institutional dynamics. For those who own very little private material resources the reliance on common or open access resources is inevitably higher. Their stake in the preservation of commons does not necessarily become higher on this account alone. There is a need to link the stakes of individuals in different resource markets with their expectations of returns across these markets. The supply of resource when it is most needed may make all the difference to its value just like increase in constraint even if of a small magnitude but beyond a critical limit breaks the back of the camel by a single straw.

PART 2

Eco-Sociological Framework for Risk Adjustment:

We present the discussion on survival under risk through reliance on commons and private resources at three levels of analyses:

1. 4-S Model: Interaction between, season, sector and social exchange. (Gupta 1981:1984, 1985),

As shown in Figure 1 each dimension of the matrix can be dichotomized in its contrasting dimensions. For instance, space can be seen in terms of low land or upland , low population density or high population density, lesser or higher slope . Likewise seasonality can be contrasted in terms of high or low rainfall, diurnal temperature variations or any other parameter of climate. The sector can be contrasted in terms of specialized or diversified portfolios, private or public, single specie versus multi specie portfolios.

Our contention is that if we know any two dimensions we can speculate about the third. Likewise, if we know the three dimensions we can speculate about the fourth dimension that is nature or pattern of social exchange. If we know

all the four dimensions we can then more carefully explore the type of common property institutions that may emerge to satisfy collective expectations of fair and sustainable collective behaviour.

Let us take the combination of two dimensions that is low population density and low rainfall that is high diurnal temperature variations and also high seasonal fluctuations. There is an inverse empirical relationship between the average amount of rainfall and its coefficient of variation. Thus lesser the rainfall higher is the variation over time and space. It is for this reason that communities living in such high risk environments diversify their portfolios over time , space and sector.

The sectoral portfolio would thus be diversified over time and space and gender. That is different family members would pursue either same or different occupations in different parts of the year and in different resource markets.

The social exchange conditions will indicate at least three major features; (a) the generalised reciprocities will dominate over the specific ones, (b) the kinship networks will dominate over the atomized households and (c) the books of accounts among family members and between households would be tallied or settled over a very long period of time as against **shorter** term settling in more commercialised communities.

The type of common property institution which may emerge here may have both **episodic** and **continuous** or **concurrent** rules. The episodic rules refer to directions of behaviour which become important only in the times of crisis. These are actually meta rules which provide guideline for evolving rules in

such institutions. The specific rules may of course vary from crisis to crisis. These rules are not even recalled many times in the normal times. The continuous or concurrent rules refer to the ongoing directions for behaviour. Even here the equivalence of returns and fairness of distribution may first be evaluated at the level of kinship or lineage group. Only later it may be evaluated across groups and resource markets. Gross compensation or subsidization may be practised more on moral grounds than just on economic grounds. For instance, not letting anyone's sleep hungry may implicitly be understood as a collective responsibility only at a small neighbourhood level. The conflict resolution may also be first attempted within the sub groups. Though the compensations may require adjustments across sectors and moral boundaries .

Agarwal (1990) provides an interesting example of a village where the punishment for poaching in a common property was to offer grains to the birds standing barefoot under the sun. Such a logic cannot be analysed in the classical tradition of institutional analysis. Such sanctions cannot be justified on economic ground at all. The reciprocities extend here to such claimants of resource who may not have any vote, that is, the birds. But in the process suffering in public by standing bare-foot in the sun generates a collective responsibility. It is recognised that the moral appeal may have a longer lasting effect compared to an economic tax or fine. The public display of the punishment may also generate guilt.

The institutions in the low risk-high return environment with high social atomization conditions may be more specialised with precise rules, boundaries, sanctions, and conflict resolution mechanisms. In some cases commons may be auctioned to private individuals to generate surplus for collective

se. The reciprocities may be specific and cross sectoral linkages weak at micro level.

it is obvious that 4-S model only provides a broad approximation of the institutional conditions. One would have to look into more precise dimensions to analyse institutional dynamics . We present the **eco-institutional** model next, to understand the linkage between access, assurances, abilities, and the attitudes with ecological resources, institutions, technology and culture.

2. **Eco Institutional Model : 4-A (Access, Assurance, Ability and Attitudes)**

The relationship between the variables on X and Y axis in Figure 2 is one to one at one level. At another level each variable on an axis can be related to other variables on X and Y axis (Fig.2).If we know the parameters of two dimensions on X or Y axis we can speculate upon the parameters of the third dimension. For instance, if we know (a) what type of access condition exists vis-a-vis market resources in a given situation and (b) the distribution of skills and abilities among various groups, the type of assurances both vertical and horizontal required to generate sustainable resource use can be anticipated. The **horizontal assurances** refer to others' behaviour vis-a-vis one's own at a point of time and the vertical **assurances** refer to the future returns from present investments. The attitudes are both the result or the outcome of the experience with resource utilisation and also the causal influence on the response to institutions. The attitudes provide a cultural basis of institutional working.

Once we have pursued the first and second level analysis of the institutions, we can move to the third level analysis given by **eco-sociological** framework (Fig.3). The micro level evolution of portfolios including options of resource

use from private, public and common properties can then be better understood.

3. Eco-Sociological Paradigm (fig.3)

We make two assumptions: (1) Ecological conditions define the range of economic choices that can be sustained in given region; (2) The scale at which different enterprises are selected however, is a function of the access to factor and product markets, kinship networks, public, private and common institutions, historical resource reserves etc. Instead of calling it socio-ecological as we did it so far we call it now eco-sociological because of the dominance of the ecological dimensions of the sociological processes.

Earlier we assumed that in any given ecological niche only certain economic enterprises were feasible at the given level of technology and institutional infrastructure. However, we modify this condition to suggest that ecological endowments of proximal environment where a social community is located need not be focussed only. The distant environment where the community has customary or traditional rights through migration or any other such means have also to be taken into account.

Thus once a mix of enterprise or a portfolio is selected drawing upon resources from private, public and common properties, the nature of risk inherent in these portfolios can be analysed through a matrix of means or average and variance. The high mean - low variance portfolios would obviously be different in their implications for individual and collective behaviour than the portfolios with low mean and high variance.

Given an initial portfolio and its mean-variance or risk-return characteristics households may respond to given risk in the environment

through following alternative means.

- a) Household level risk adjustments
- b) Public risk reducing mechanisms and
- c) Communal and common property risk adjustments.

The household risk adjustments can be further analysed at intra-household level and inter-household level. The intra-household risk adjustments include measures which a household can take recourse to by negotiations within the households. For instance, asset disposal, migration and reduction or modification of family consumption. The inter-household risk adjustment strategies include tenancy, borrowing, labour contracts, group ploughing, etc.

The public risk adjustment mechanisms imply availability of drought, flood relief, insurance mechanisms, public employment programmes etc.

The communal risk adjustment strategies refer to the group based measures which require collective decision making either for utilizing or preserving private or common property resources.

Our contention is that even to understand the common property institutions we should analyse the resource relationship through various analytics as described above. Once the access to these risk adjustment options is known the households may modify either their perceptions or response or both by changing the discount rate or time frame used for appraising returns from each investment.

In turn the cash flows of the households may be in surplus, deficit or subsistence. In addition, the variability in these cash flows may be evened out over space, season, sector and social networks. The stakes of different

social groups in management of ecological systems would vary in each resource market.

The trick is to develop a calculus in which unequal stakes of different groups in various resource systems or regimes generate a set of expectations which are equitable or appear equitable (given differences in cultural and social ways of perceiving returns) at the portfolio level of households (also see Nayak,1990). The fairness of these distributions cannot be estimated in our view from the individual point of view only. The group level estimation of aggregated effects of Individual portfolios may generate rules that modify the conditions for use of resource, technology and institutions. Under extraordinary circumstances the cultural norms are also modified to accommodate ecological and sociological imperatives as seen in the case of Buddhist Bhutan.

Part 3; Questions in search of answers

There are several issues which still are not explained appropriately. For instance, we do not know adequately the combination of conditions which generate positive and negative feedback effects on culture.

know that the practice of burial of dead people may have emerged among the Muslims because this religion evolved in deserts where supply of wood for burning might have been a constraint. Likewise, the custom of providing a share in the food for birds, ants, dogs etc. might have evolved among Hindus to co-exist with various animal species in a rich biological environment of Indo-Gangetic plains. However, these are very partial and insufficient explanations of cultural codes. We need rich descriptions of cultural mechanisms to conserve commons. Work by McCay and Acheson (1987), Giralch and Palmer (1981), Brara(1988), Kavoori(1989), Bonfigliali(1990), Niamir(1989)etc., are good illustrations.

We do not know adequately what levels of analysis are most productive and parsimonious in different ecological, cultural and technological contexts. To what extent the ethics of using sustainable low return technologies but compatible with common property institutions can adapt to the consumerist onslaught from the West.

Whether the assurances which were considered satisfactory in past will continue to be seen as such in future in the light of increased expectations from democratic populist governments. Distribution of relief during drought and floods has not only made some of the communal survival institutions redundant but also weakened the self help potential. My intention is not to underplay the importance of short term relief in the event of natural disasters. What I do feel however, is that the same relief can indeed be blended with the local self help potential and cultural and ecological and institutional endowments. The learned helplessness among the disadvantaged households in backward regions where CPRs are most critical for survival, generates alienation and sometime eco-destructive protests.

The survival of commons is necessary as a concept for sustainable development particularly in high risk environments. But we have to establish linkages between macro political economic regimes and micro and meso levels eco-sociological institutions. Analysis of common property institutions in isolation of private properties, open access resources, and cultural codes would serve only limited purpose.

The ethical basis of this framework needs careful analysis because the Eastern world view does differ from the Western perspectives. Within Eastern perspectives, the ethnic and tribal differences have to be accommodated.

The discontinuities, disorder, chaos, apparent In resource relationships has provided basis for individual and collective innovations. The search for sustainable solutions to decline of commons calls for an equally optimistic trust in human inventiveness and an eye for variability. Will global efforts accommodate local frameworks is a question that will answer perhaps several of the above questions.

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some additional references attached

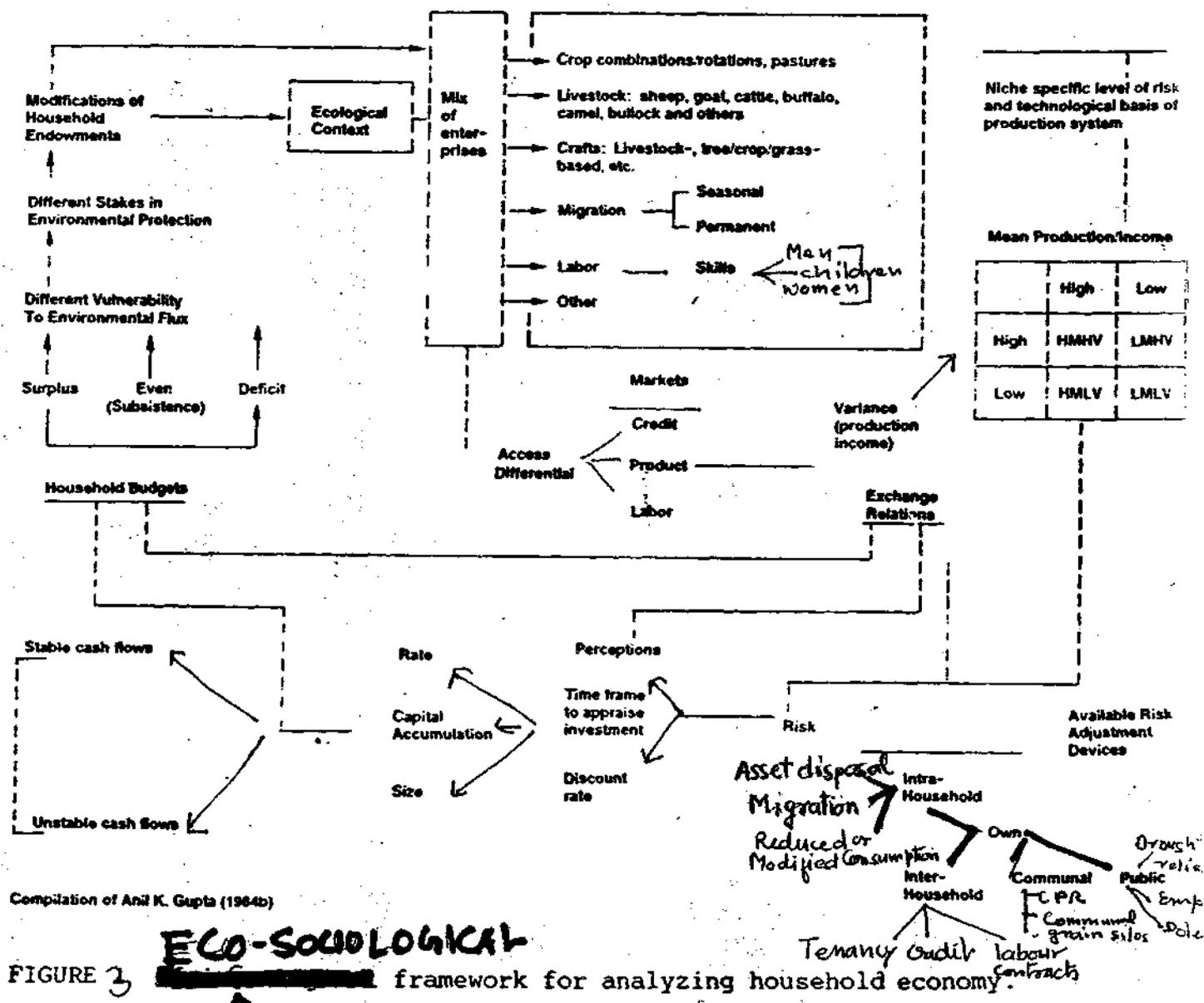


FIGURE 3

ECO-SOCIOLOGICAL

framework for analyzing household economy.

Fig-2

Eco/Institutional Framework for analysing Choice of Technology

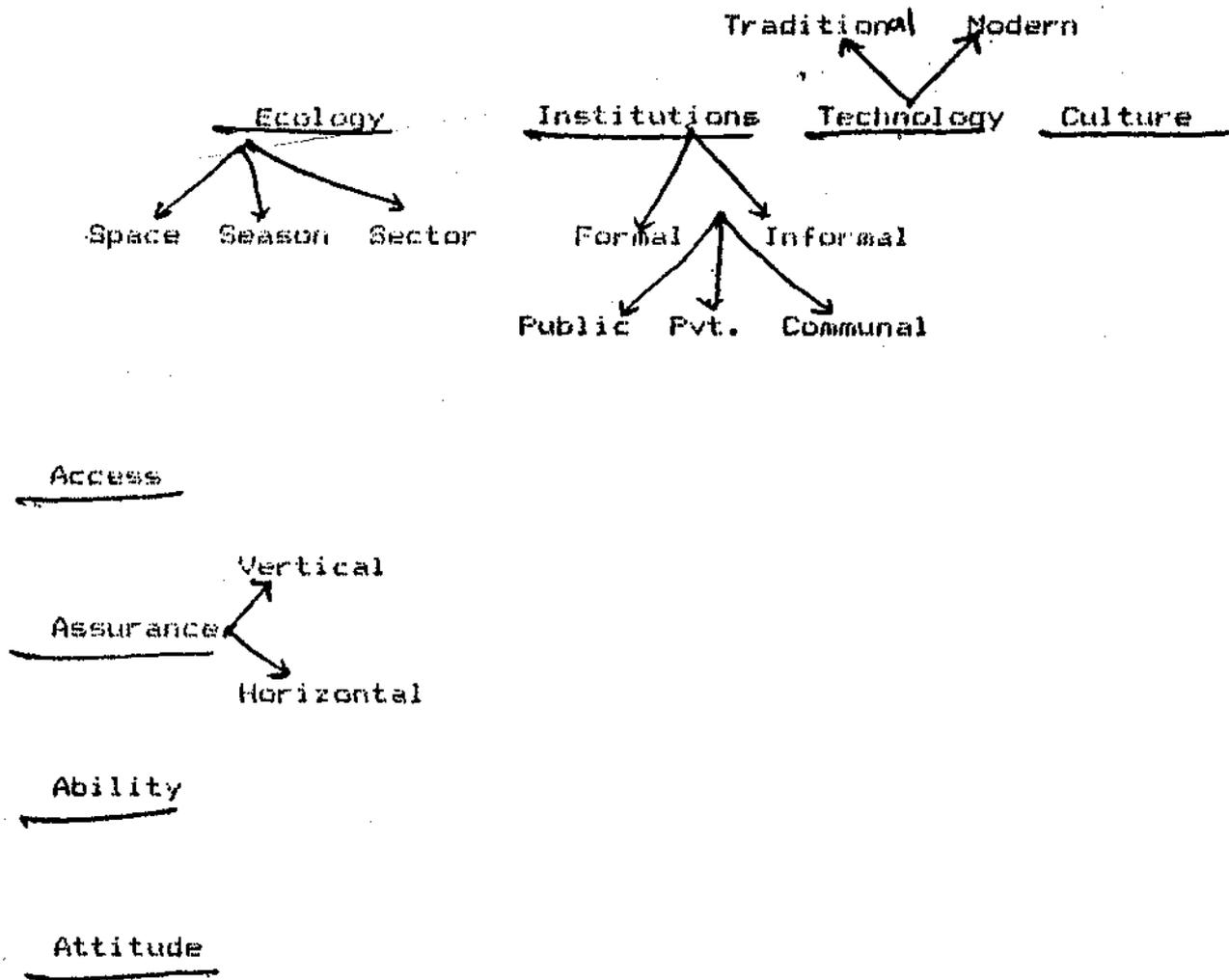


Fig. 2

(Gupta, 1990, own compilation. Adapted from Socio-Ecological Paradigm, Gupta, 1984, 1989)

fig-2

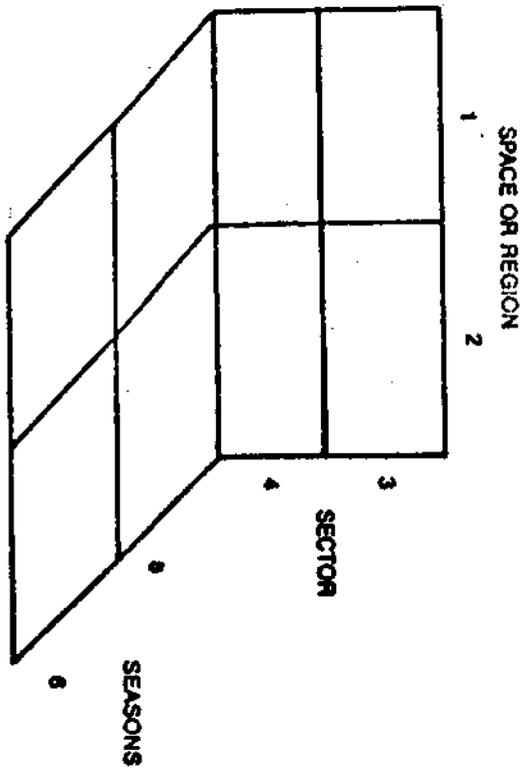


Figure 1

Fig-one