

# Resource Management Systems: Then and Now

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## Scope of the document

At first a few traditional systems of resource management are presented. This is followed by a brief discussion on a common pool resources and their management. Then principles for rural ecosystem rehabilitation are furnished. Finally an example of participatory projectization in resource management is provided.

## Tradition system of resource management

Gadgil and Berkes (1991) dealt with biodiversity, traditional resources and their management systems. They opined that the modern resource management science is well suited, by design, for conventional exploitative development, but not for sustainable use.

The rejection of a monolithic scientific resource management vision does not mean the rejection of all western science. The task is to develop a flexible approach. Ecology as a science is concerned with the whole (rather than its parts) components. It is concerned with diversity and adaptiveness. It is not monolithic.

In detailed study Gadgil (1989) pointed out that *Haviks* of Uttara Kannada grow spice gardens which emulate the multistoried forest of the hills. They have cardamom as the ground layer, plantains or cocoa as the middle layer and betelnut trees as the upper layer. Each betelnut tree has a pepper vine coiling around it. The periphery of the spice garden is lined by tall mango, jackfruit and coconut trees. These gardens are located in the valleys and the hill slopes supply vital leaf manure and mulch for them. Traditionally the gardeners had rights over the hill forests. These hills are well maintained by the gardeners. They are known as green hills.

Over years, however, the situation has changed. Over the last four decades, better prices for betel nut have enabled the farmers to engage local labour to collect the leaf material from the gardens. More and more leaves were indiscriminately collected by the labour to obtain more wages. And now the hills are a very sorry spectacle as the trees are brutally topped.

Now the farmers realized that they must strive to preserve the biological diversity of their lands. They are working hand-in-hand with the Forest department to establish a series of groves of a few hundred hectares each. They have rediscovered the sacred grove.

Barren hills are planted with trees, grasses and legumes. Most of them are indigenous. Nurseries for the purpose are decentralized and through a cooperative venture the plantings are taken up.

Similarly while rehabilitating degraded community lands in Garhwal, Himalayas Maikhuri (1997) concluded that tree-based cropping with the backstopping of traditional knowledge would be most suitable. The approach involved creation of supplemental irrigation capacity through water-harvesting tank technology and planting of native multipurpose trees (10 were chosen from 19 species), and economically important crops preferred by the local communities (various legume, oilseed and vegetable crops were chosen from among 8 cereals, 10 legumes and 12 oilseeds / vegetables) on repaired terraces. Involvement of the whole village community in the decision-making process was identified as a potential mechanism of securing local participation. Supplemental irrigation improved survival and growth of tree ranged from 39% in *Albizia lebbeck* (*Siris*) to 164% in *Boehmeria rugulosa*. Growth response to irrigation was most prominent in *Grewia oppositifolia* (*Bhimal*), in terms of height, and in *B.rugulosa*, in terms of diameter at collar height. Irrigation enabled higher crop yields with substantially lower organic manure and seed inputs compared with the rainfed (non-irrigated) system. Monetary output:input ratio of crop component in the irrigated system was 1.97 compared with 0.86 in the non-irrigated system. Total rehabilitation cost of the irrigated system was recovered over a period of three years.

Another example comes from Rajasekharan and Warren (1994) for the Kolli hills of Tamil Nadu. The people of the Kolli hills are very knowledgeable about fruit production. In all agrarian societies, indigenous food production systems form the basis of food and nutritional security. These people market fruits and with this income, they purchase protein and fat requirements. Changing sociocultural values, population growth and poor revenues from fruit markets have resulted in the need for more income. Although local people are aware of the consequences of deforestation, their socioeconomic priorities promote the cutting of trees, leading to the disappearance of indigenous agroforestry systems in the Kolli hills. The authors conclude that the establishment of a structured cooperative marketing society would turn the fruit market into a remunerative enterprise. It is also essential to

develop environmentally suitable varieties of rice crops by combining indigenous and high yielding varieties. Policy interventions should take into account both the socioeconomic priorities and indigenous knowledge systems of local people, which would stimulate the regeneration of the agroforestry system in the Kolli hills, they said.

*Orans* in Rajasthan is yet another example of biodiversity. *Orans* are sacred woodlands around a temple. *Orans* are areas dedicated to one or more deities worshipped by the community and can be called sacred forests. In Rajasthan, 1100 *orans* covering an area of over 100,000 ha are reported (Singh and Sisodia 2003). We shall examine two such *orans*.

## 1. Shital and Gopal Das Ki Deobani

There are two different *orans* located in two contiguous villages of Alwar district. The *oran* is 40 ha. In *oran*, felling of trees is a taboo and the *oran* is managed by the village community.

There are 45 species of trees. Some 27 species are reported to be extinct from these groves. The dominating trees are *Dhak*, *Kair*, *Ber*, *Pipal*, *Neem*, *Bargad*, *Gular*, *Solar*, *Babul* and *Khair*. The known plants under threatened list are *Guggal*, *Kadam* and *Dhak*.

*Dhak* serves the community in many ways. They include a) medicinal purposes, b) edible fruits, c) honey, d) fibre, etc. They provide food for birds and livestock during lean periods.

A *talab* in Gopal Daski Deobani and *Kund* (natural spring) in Shital Daski Deobani are the water resources. The local people protect and preserve this *oran*. They even provide grain for the birds that perch on the trees of the *oran*. The wild herbivores are considered to buffer against predators and cattle lifters. Coming to animals, jackal, deer, rabbit, snake, mongoose, squirrel and birds like peacock, parrot, etc. are commonly found in the *Oran*.

Thus there is a fine equilibrium among the fauna and flora. The wild animals control the herbivores population.

## 2. Bherunathji Ki Bani

This is a small area of 12 ha located in Alwar district. Besides varied flora and fauna, this *oran* has a *johad* that caters to the requirements of livestock.

The most dominant tree is *Dhok* (532 out of 600 major trees). Other species include *Kair*, *Ber*, *Pipal*, *Khair*, and shrubs like *Adusa* and *Bansa*. The species reported extinct include *Hingota*, *Sadahari* and *Abalakanta*.

The villagers protect the *Oran* assiduously, more so because they realized that the perennial streams dried up due to deforestation in the area above their village. The livestock is 1356, more than carrying capacity of the *Oran*. So the villagers send their livestock, barring milch buffaloes, to the mountains to prevent overgrazing leading to drying up the only *Johad* in their village.

The four main purposes of the *Oran* for the villagers include medicine for health care of people and livestock, feeding livestock, watering and resting place for livestock. Only, deadwood is taken out and used either for workshop or cremation.

**Concerns:** *Orans* support / enhance biodiversity. They are the source of water, food, fodder and fuel. Despite these characteristics, *Orans* are declining and shrinking. The diversity is eroded. Currently, at least 3% of wild flora and more of wild fauna are on the threatened list in these *Orans*.

Earlier (1934) Alwar administration declared these areas as protected forests. After independence, however, the state is gaining ground ignoring the community. As a result, the traditional community practices of *Oran* conservation and management is rapidly being abandoned. Over a million people dependent on livestock are struggling hard for survival because of the decline, shrinkage and transfer of management of this wonderful institution – *Oran*.

Traditional systems of farming like mixed cropping, agroforestry, shifting cultivation and integrated farming systems, are other means to achieve sustainability said Berkes *et al* (1995).

They further argued that the common property theory provides some general guidelines and policy prescriptions for community-based conservation.

- Eliminate open-access condition in areas to be conserved.
- Balance resource-use rights to the local population with responsibilities.
- Legally protect land tenure and marine tenure to the local communities.

Sharing of the conservation responsibility and benefits would require cooperative management between local organization and the government. So in a management plan, the rights and benefits need be spelt out.

## **Resource development in India**

From the critiques' angle the resource development in India is provided below.

After 50 years of centralized planning, we now have a vast network of irrigation canals of the running day, a fast vanishing forest canopy, the depleted top soils that are destroyed through chemical agriculture, inefficient production systems in the public sector and a society thoroughly riddled with terrific corruption at all levels and finally a fully criminalized body politic (Das Gupta 1998).

India's development planning does not provide for continuity or sustainability of the momentum of growth. Planning must include cultural and spiritual values and the human side of life, as prescribed by the National Planning Committee. Planning process itself was sometimes used as a tool for playing national and state political game, thus defeating the very philosophy of planning. Politicization of planning process / defeats, its actual social purpose and destroys sustainability of the economy. Planning for localized communities and individual members of the society is not done.

All linear movements usually end up at a dead end or in a final dissolution of material resources. Nature does not follow linear path. It is more cycling and renewing. Thus the path is curvilinear.

Gandhi (1956) pointed out that economics do not take into account the conduct of man but hold that accumulation of wealth is the sign of prosperity and that happiness of nations depend on their wealth alone. The more factories, the merrier. He also pointed out that persons themselves are the wealth, not gold and silver. Human resource is the most critical natural endowment. No economic growth can succeed and ecologically sustain itself in a society. If there is no parallel development in the field of mass awareness and real education. For the last 50 years, the resource development could not sustain due to ignorance, ill-education, incompetence and crawling spectra of corruption at all places.

## Common Pool Resources (CPRs)

The CPRs are estimated to be 77.5 Mha in our country (Anonymous 2002)

The CPR area in selected states are estimated are given in Table 1 (Chopra and Gulati 2001)

**Table-1: Estimate of CPRs as % TGA**

| State                                     | Jodha's estimates | Agrl. Statistics of India |
|---|-------------------|---------------------------|
| Andhra Pradesh                            | 10.8              | 14.0                      |
| Gujarat                                   | 11.0              | 11.0                      |
| Karnataka                                 | 16.3              | 11.0                      |
| Madhya Pradesh (inclusive of Chattisgarh) | 24.1              | 15.0                      |
| Maharashtra                               | 14.7              | 19.0                      |
| Rajasthan                                 | 14.0              | 34.0                      |
| Tamil Nadu                                | 10.3              | 18.0                      |

The CPRs contribute towards fuel, livestock grazing and NTFP. The income generated for the poor families from CPRs is estimated in a study by MYRADA (1997). The details are as follows (Table 2)

**Table-2: Contribution of CPRs in household income**

| State          | Household category | CPR contribution/ household |                          |                   |             | Income as % of total |
|----------------|--------------------|-----------------------------|--------------------------|-------------------|-------------|----------------------|
|                |                    | Fuel (%)                    | Livestock grazing (days) | Employment (days) | Income (Rs) |                      |
| Andhra Pradesh | Poor               | 84                          | -                        | 139               | 534         | 17                   |
|                | Others             | 13                          | -                        | 35                | 62          | 1                    |
| Gujarat        | Poor               | 66                          | 82                       | 196               | 774         | 18                   |
|                | Others             | 8                           | 14                       | 80                | 185         | 1                    |
| Madhya Pradesh | Poor               | -                           | 83                       | 185               | 649         | 20                   |
|                | Others             | -                           | 29                       | 34                | 170         | 3                    |
| Maharashtra    | Poor               | 75                          | 69                       | 128               | 557         | 14                   |
|                | Others             | 12                          | 27                       | 43                | 177         | 1                    |
| Rajasthan      | Poor               | 75                          | 69                       | 128               | 557         | 23                   |
|                | Others             | 12                          | 27                       | 43                | 177         | 2                    |
| Tamil Nadu     | Poor               | 12                          | 27                       | 43                | 738         | 22                   |
|                | Others             | -                           | -                        | 31                | 164         | 2                    |

All our watershed programmes are aiming at improved management of CPRs. In fact, this approach has a win-win situation benefiting the poor (landless) as well as the landowners. The usufructs of the CPRs would benefit the former, while the improved groundwater recharge due to enhanced vegetal cover of CPRs (with better management) benefits the latter.

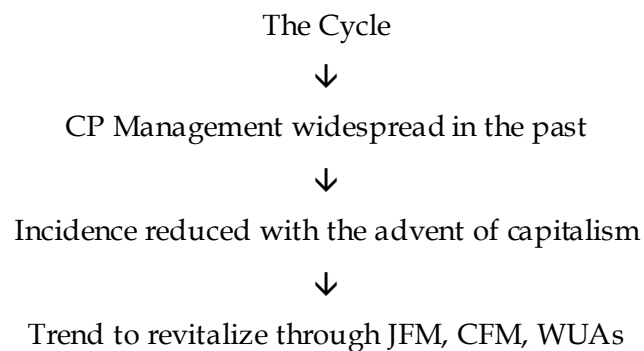
Senugupta (1995) while discussing issues on CPRs said that on an average 20-25 % of rural income is obtained from CPRs. These estimates are only on the existing situation after

decades of complete neglect and rapid degradation. Considerably more can be obtained from systematic development of this marginally used resource.

More women workers have been engaged in CPR activities than men. The impact of good CPR management on the poor is not just economic. It is far more profound in nature. It is a step forward towards incorporation of grass root democracy and traditional wisdom into the development of culture (Jodha 1992).

The state is trying to improve CPRs through formation of

- Forest Protection Committees
- Water User Associations
- Joint Forest Management, now CFM



In this world of vitality and variety, cooperation is not impossible and tragedies consequent upon non-cooperation are not unavoidable. CP organizations must also benefit from such realization, said Ratna Reddy (1999).

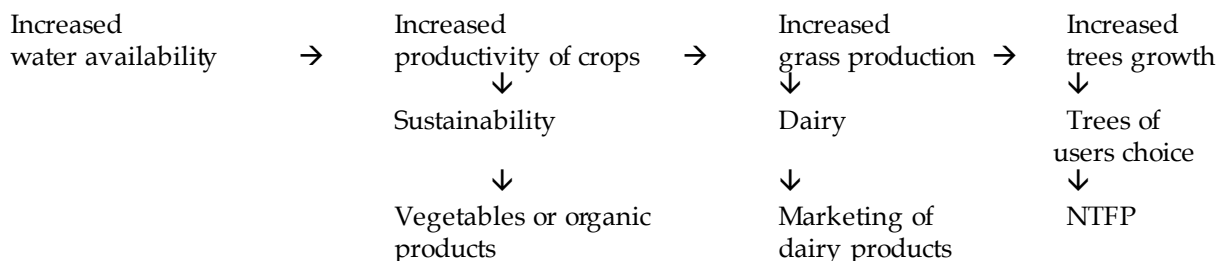
There is the well-known *free-riding* problem. Without containing this possibility, cooperation cannot be established and organizations can never be found. The vested interest jargon is that poor / poverty area / is responsible for degradation of CPRs. However, Ratna Reddy (1999) opined that there is no direct link between poverty and environmental degradation. In fact, the evidence is on the contrary. In IRMA studies, a suggestion is made to recognize and reward those who have been important actors in improving CPRs. This encourages others to emulate.

Unless there are also economic and social incentives to cooperate, organizations cannot have solid foundation.

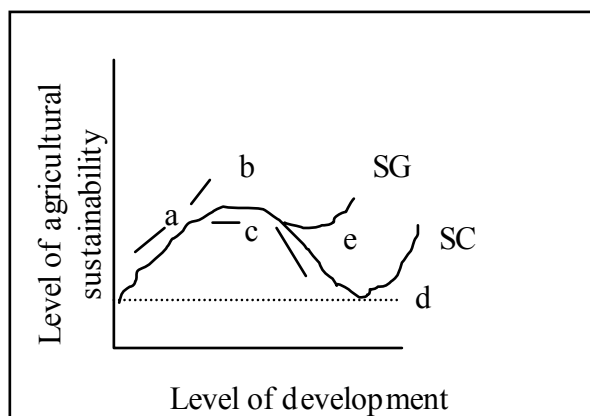
## Eco-regeneration and its impact on biomass based village

Agarwal and Sunita Narain (2000) in their study reported various stages, steps and results in eco-regeneration.

### Stages



In this context, they pointed out that rainwater harvesting has to be everybody's business for ecological security. In other words, they called for empowerment of rural community over the ecological resources. The fallacy that the rural poor are responsible for ecological degradation was refuted by Ratna Reddy (1999). In fact, he said, evidence is on the contrary.



**Fig.1: Development vs Sustainability**

### Sustainability

Ratna Reddy (1995) and Deshpande and Ratna Reddy (1990) dealt with environment and sustainable development. They discussed in detail the story of *Pani Panchayat*.

*Pani Panchayat* creates surface water and by agreement limited to low duty crops. However with time private wells came up exploiting the ground water recharge. Then sugarcane came back. Sustainability followed cyclical pattern in this case.

- (a) Some regions are on the rising portions on the sustainability curve (SC-a) - when a new project is launched.
- (b) Others on the plateau portion (SC-b) till the donor and backstopping is provided with time and / or as donor is out and no roles are available.
- (c) Some on downward sloping portion (SC-c) (i.e. excessive extraction).
- (d) Lowest level of agricultural development. This happens due to overexploitation (SC-d). Then there would be realization and slowly disciplining

- (e) NGOs or even GOs can improve the cycle with appropriate interventions.
- (f) The agricultural sustainability moves between (b) and (d) cyclically.

Sustainability definitions fail to comprehend with the overall objectives of inter-and intra-generational equity. It should not stop at providing them with livelihoods alone to realize sustainable agricultural development. People’s awareness, attitudes and perceptions towards environment need a change. The instruments for the change are

- i. Literacy
- ii. Market forces
- iii. Institutional changes in terms of agrarian reforms

Therefore HRD should take the centre stage in the development planning. Also primary education, health, etc. need attention, a point will made earlier. Another potential area is development of environment friendly and economically viable technologies.

**Equity issues**

Equity issues can easily be a part of development planning only with peoples awareness (education). The management strategies are viewed differently by the small and large farmers (Table 3)

**Table-3: Management strategies of small and large farmers for groundwater and grazing lands**

| Farmers       | Groundwater  | Grazing lands   |
|---------------|--|---|
| Small farmers | To be managed on community basis (collective action) | To be managed privately                               |
| Large farmers | To be manage privately (private property rights)     | To be managed on community basis. (collective action) |

These varying strategies are due to the absence of effective institutions and clearly defined property rights in commons. Large farmers draw a disproportionately larger share from commons. This is also proved in the NATP study (Sastry *et al* 2004). The LMF were benefited more (to the tune of 48.1% over SMF). The SMF crave for community share of water as otherwise more of it would be usurped by LMF.

Coming to the contribution of men and women in NRM, women contribute more than 50% of time in NRM. Women’s contribution is substantial even with higher farm size. This is true even with humid, non-tribal areas as in Himachal Pradesh. Evidently with the

advent of market changes the general belief that women of larger holdings would not participate more due to status consciousness as seen in the following Table 4.

**Table-4: Share of women in natural resource use across size classes**

(Percent of time allocated)

| Time to allocated to collecting | Humid zone <sup>1</sup> |    |    |    |    |     | Market agricultural zone <sup>2</sup> |    |    |    |    |     |
|---------------------------------|-------------------------|----|----|----|----|-----|---------------------------------------|----|----|----|----|-----|
|                                 | 01                      | 02 | 03 | 04 | 05 | All | 01                                    | 02 | 03 | 04 | 05 | All |
| Drinking water                  | 79                      | 84 | 95 | 90 | 81 | 78  | 73                                    | 64 | 67 | 62 | 68 | 67  |
| Fodder                          | 47                      | 50 | 59 | 50 | 30 | 47  | 88                                    | 77 | 69 | 76 | 83 | 76  |
| Grazing cattle                  | 21                      | 29 | 35 | 20 | 05 | 25  | 56                                    | 59 | -  | 69 | 71 | 64  |
| Fuelwood                        | 67                      | 56 | 61 | 48 | 20 | 63  | 36                                    | 45 | 36 | 34 | 31 | 37  |

**Note:** Size classes represent marginal (01), small (02), medium (03), semi-medium (04) and large (05) farmers. 1: Western Ghats of Maharashtra , 2: Himachal Pradesh

### Policy issues

- Property or user rights of CPRs should be charged on equity basis, according to the use criteria.
- To be effective, groundwater should be treated as a real CPR

In better endowed areas water rights can be auctioned but in scarcity areas the community should take responsibility of distributing groundwater rights in an equitable manner. This means banning of extraction of groundwater by individuals. Hence groundwater development be the job by community.

### Ecosystem rehabilitation

Evidently the environmental problems are more conspicuous in the more fragile resource regions due to harsh climatic conditions completed with lack of protective irrigation. While summarizing the proceedings of International workshop on conserving the sacred for biodiversity management, Ramakrishna *et al* (1997) also indicated that water could be used as the triggering agent for rehabilitation of degraded / fragile lands and biodiversity management. The general principles related to rural ecosystem rehabilitation need be

1. Rehabilitation and management would only succeed if short-term economic benefits are assured to local communities, apart from long-term benefits envisaged.

2. If rehabilitation and management strategies are to be effective and successful, women's' participation is necessary.
3. Without a broad understanding of the complexities of the system (through rapid appraisal methodology), rehabilitation strategies may not succeed.
4. Unless ecosystem rehabilitation and management leads to a general improvement and maintenance of soil fertility and water quality, it is not sustainable.
5. Ecosystem rehabilitation will be sustainable only if: (a) internal control of processes (e.g. resource recycling) within the ecosystem are strengthened, (b) dependence on external subsidies (e.g. fertilizers) are minimized, and (c) self-regenerating capacities enhanced, to the extent feasible.
6. In order to succeed, ecosystem rehabilitation should have strong community participation in planning management, implementation, and continuous monitoring of all these parameters.
7. Unless rights and responsibilities of ownership are clearly defined and understood by all the participants, ecosystem rehabilitation is not likely to succeed.
8. If community participation is to be effective, community/user group institution will have to be built into the rehabilitation strategy.
9. Unless land capability analysis and classification, taking into consideration scientific / traditional knowledge is integrated, rehabilitation work will not be effective and sustainable.
10. Empowerment (training, institutional, access to facilities and resources) of local communities in general and vulnerable sections (landless and women) in particular is crucial for the success of any rehabilitation programme.
11. In order that rehabilitation work is sustainable, surface and groundwater water resources and its exploitation is monitored and appropriately regulated through institutional mechanism.

By providing water outside the monsoon period through appropriate and cheap eco-technology, they could show a variety of land use systems that would be sustainable.

## Perfect project

That participatory projectisation is needed in resource management on a sustainable basis is clearly shown in the Indo-UK ORP project (1975) at Indore. The steps towards a perfect peoples project as adapted from van Rooyen (1998) are given hereunder adapting the Indo-UK Project (Table 5).

**Table-5: Towards a perfect project (van Rooyen 1998) for sustainable NRM**

| Process or phase  | Objective                 | Action   | Indian case study  |
|-------------------|---------------------------|--|--|
| Diagnosis         | To understand the problem | <ul style="list-style-type: none"> <li>• PRA / Situation analysis</li> <li>• Workshop the problem. Include all stakeholders (community, scientists and extension people; NGOs; youth, women and the elderly).</li> <li>• Focus on available information, local and scientific.</li> </ul>  | <ul style="list-style-type: none"> <li>• <i>Kharif</i> fallow in Malwa region</li> <li>• Surface drainage problem, presently leaving the land for <i>rabi</i> cropping, subjected to erosion, not capitalizing on the scope of taking two crops in a year, at least an assured <i>kharif</i> crop</li> </ul>   |
| Conceptualization | To agree on actions       | <ul style="list-style-type: none"> <li>• Develop ideas, hypotheses, strategies in collaboration with all stakeholders</li> <li>• Clearly define and prioritize the options</li> <li>• Answer all the where, why, who and when questions</li> <li>• Clearly define every role - players' responsibilities</li> </ul>                        | <ul style="list-style-type: none"> <li>• Provide surface drainage</li> <li>• Adopt doable technologies</li> <li>• Divert rainwater through small cross section bunds laid across the slope</li> <li>• Such drains feasible with locally available farm tools. The surface runoff was collected through gabions in the 'nalas' constructed by the project</li> <li>• Primary stakeholders can taken up such 'on-farm works'. The gabions are taken up by the public funding.</li> </ul> |
| Execution         | To take action            | <ul style="list-style-type: none"> <li>• Maintain linkages with all stakeholders throughout the project.</li> <li>• Meet frequently, formally or informally as needed.</li> <li>• Onsite research is important because it gives stakeholders a feeling of ownership and it has a very high demonstration value.</li> </ul>                 | <ul style="list-style-type: none"> <li>• The ORP team (Indian and British) maintained continuous linkages with the farmers through frequent meetings.</li> <li>• The philosophy and the feasibility have been under test on-farm by the JNKVV scientists along with the British group</li> </ul>   |
| Evaluation        | To assess the impact      | <ul style="list-style-type: none"> <li>• Evaluation is a continuous process. Each phase should be continuously evaluated at various levels.</li> <li>• Also evaluate project participation as it is in many ways indicative of project acceptance.</li> <li>• Evaluate the acquired knowledge in terms of indigenous knowledge.</li> </ul> | <ul style="list-style-type: none"> <li>• Feasibility established</li> <li>• The twin track approach of surface drainage by the farmers and the 'nala' treatment through gabions constructed by the government is now accepted</li> <li>• The gabions possible in Malwa as the needed stones are locally available. But in areas when stones are not</li> </ul>   |

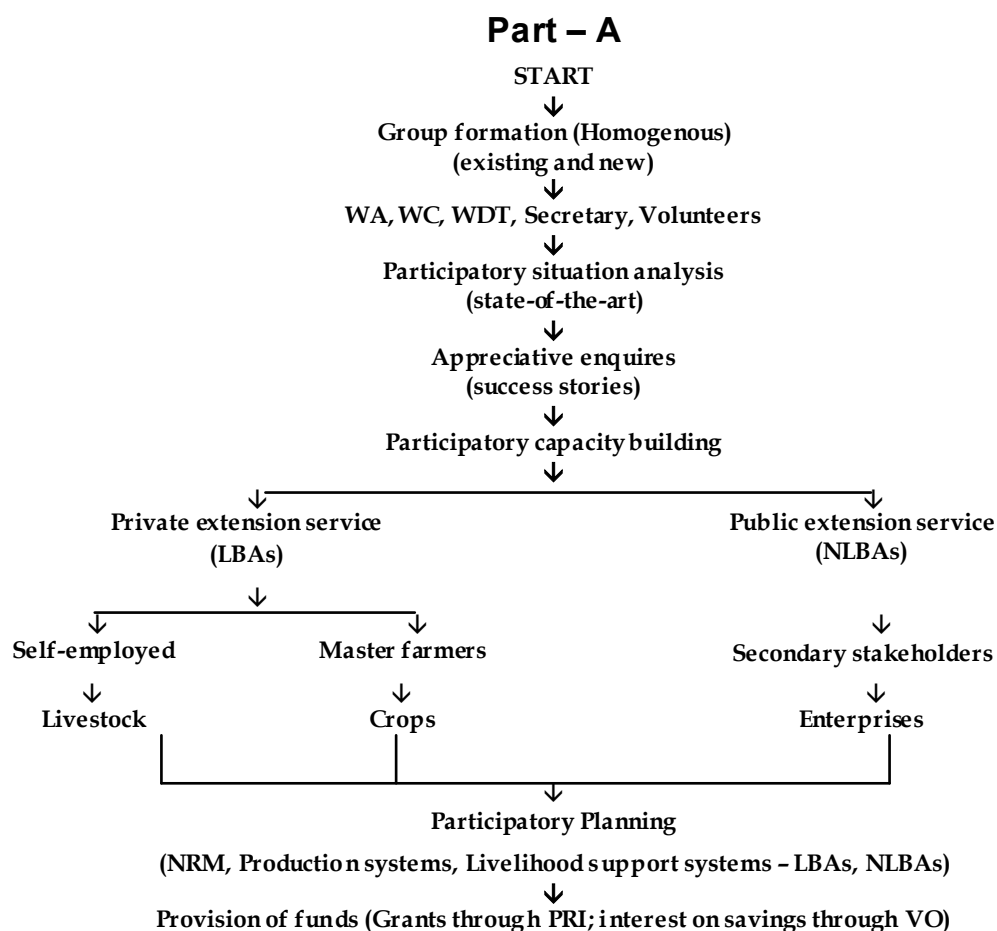
|           |  |  |   |
|-----------|--|--|---|
|           |  | <ul style="list-style-type: none"> <li>Final evaluation will normally lead to further questions or challenges, which can then be redefined into new projects if needed.</li> </ul>   | easily reachable other structures than gabions would be needed.   |
| Diffusion | Feed into the policy / development framework. Institutionalize the information | <ul style="list-style-type: none"> <li>Disseminate the information to all stakeholders and other interested parties in the appropriate way (local communities, neighboring communities, provincial and national governing bodies).</li> <li>Disseminate the information to the general public. (In many case the research has been paid for tax money).</li> </ul> | <ul style="list-style-type: none"> <li>Surface drainage accepted.</li> <li><i>Kharif</i> cropping has been a reality</li> <li>Soybean has come up in a big way</li> </ul> |

To sum up, all the above case examples it is brought out that for sustainable development of natural resources the necessary ingredients, among others, are:

- Peoples participation
- Imparting skills to the unskilled
- Additional benefit to accrue from the programme (e.g. water beyond monsoon, a crop for *kharif* fallows)
- Special dispensation for fragile areas
- Community control on use of the improved / created CPRs (e.g. grazing lands, enhanced groundwater recharge)
- Sharing of usufructs with a pro-poor bias

To achieve above goals capacity building of the facilitators as well as doers (beneficiaries) is the need. As Gandhi said the facilitators have to first learn from the village communities on the present state-of-the-art (participatory situation analysis), the successes in NRM (appreciative enquiries) and their aspirations and needs (participatory approaches). Then the facilitators can place before the doers the various options available including in-village successes and case examples from elsewhere under similar agro-ecological situations. The choices have to be left to the doers. But much earlier to that the facilitators must encourage the village community to form into homogenous groups, not ignoring the already existing such groups in the habitat. Then for the successful planning, in capacity building the suggestions are to be on a watershed basis, as it is the primary unit in rural development. The flow chart would be as follows.

The planning processes must then follow a flowchart as suggested below.



Evaluation of the completed WDP should be taken up jointly by WA members and secondary stakeholders.

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