ARVARI CATCHMENT
A SUB-STATE SITE IN RAJASTHAN
BIODIVERSITY STRATEGY AND ACTION PLAN

Coordinated by
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Preface and Acknowledgements

The catchment of river Arvari is situated in Alwar district of Rajasthan and is receiving less than 600mm rainfall annually. Once, River Arvari used to flow perennially but with the continuous existing drought conditions and due to depletion of Ground Water, it dried up and the whole Thanagazi block was declared as "Dark Zone" in Government records. Village community along with a local NGO, Tarun Bharat Sangh (TBS) have built around 250 rainwater-harvesting structures in 72 villages in the Arvari catchment over the last 20 years. These structures have replenished ground water and increased the water table of the wells enabling the Arvari back to life and make it flow most part of the year. Some factors like development of modern practices in agriculture, marble mining etc. have adversely affected the natural biodiversity of the area. Under NBSAP project, Arvari catchment has been included as sub-state site of Rajasthan. Information about the present status of biodiversity of the area, factors causing its deterioration, problems / successful community initiatives for regeneration of forest resources and revival of wildlife and social and cultural values for biodiversity conservation by the people and possible suggestions for conservation and improvement was collected from different sections of the society and also compiled information from existing literature relevant to the area and assessed the role of major stakeholders. On-going initiatives and achievements have been highlighted in the document.

This BSAP draft is an outcome of a collective effort in which a large number of people have contributed significantly. The community people of the Arvari catchment were the basic group who provided the necessary information that has been made the basis of this draft. This document contains 11 chapters, a detailed map of Arvari Watershed, 11 annexure, seven tables, eight boxes and 23 photographs & illustrations.

I am highly grateful to members of village community, Women’s groups, Arvari Sansad, PRIs, TBS volunteers, school teachers, forest officials, gram sabha of Bhaonta – Koylala for providing the relevant information and their perceptions related to various aspects of the biodiversity of the area.

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Dr. Om Prakash
Kulhari
### Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
</tr>
<tr>
<td>CEE</td>
<td>Center for Environment Education</td>
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<tr>
<td>CBO(s)</td>
<td>Community Based Organisation(s)</td>
</tr>
<tr>
<td>CSE</td>
<td>Center for Science and Environment</td>
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<tr>
<td>CULP</td>
<td>Center for Unfolding Learning Potentials</td>
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<tr>
<td>DST</td>
<td>Department of Science and Technology</td>
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<tr>
<td>EWG</td>
<td>Eco-Working Group</td>
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<td>FD</td>
<td>Forest Department</td>
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<tr>
<td>FGD</td>
<td>Focussed Group Discussion</td>
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<td>FRI</td>
<td>Forest Research Institute</td>
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<td>GES</td>
<td>Global Information System</td>
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<td>GOI</td>
<td>Government of India</td>
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<tr>
<td>IDS</td>
<td>Institute of Development Studies</td>
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<td>JFM</td>
<td>Joint Forest Management</td>
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<td>LAC</td>
<td>Local Advisory Committee</td>
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<td>MoEF</td>
<td>Ministry of Environment and Forest</td>
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<td>NABARD</td>
<td>National Agriculture Bank for Reconstruction and Development</td>
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<td>NBSAP</td>
<td>National Biodiversity Strategy and Action Plan</td>
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<tr>
<td>NGO(s)</td>
<td>Non Government Organization(s)</td>
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<tr>
<td>NRM</td>
<td>National Resource Management</td>
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<tr>
<td>NTFP</td>
<td>Non-Timber Forest Produce</td>
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<tr>
<td>OECF</td>
<td>Overseas Economic Cooperation Fund</td>
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<tr>
<td>PRA</td>
<td>Participatory Rural Appraisal</td>
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<tr>
<td>PRI(s)</td>
<td>Panchayat Raj Institution(s)</td>
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<tr>
<td>SC</td>
<td>Scheduled Caste</td>
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<tr>
<td>ST</td>
<td>Scheduled Tribe</td>
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<tr>
<td>TBS</td>
<td>Tarun Bharat Sangh</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<tr>
<td>VFPC(s)</td>
<td>Village Forest Protection Committee(s)</td>
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<tr>
<td>VFPMC(s)</td>
<td>Village Forest Protection and Management Committee(s)</td>
</tr>
<tr>
<td>WII</td>
<td>Wild Life Institute of India</td>
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Glossary of Local Terms

Adhyaksha = Chair Person
Amavasya = Moon less night
Arvari Sansad = People’s Parliament of Arvari Catchment
Bir = Grassland for fodder grass
Bundhs = Check Dams
Dev Bani = Sacred grove dedicated to local deity
Dharadi Pratha = A traditional system of protecting a particular plant of animal species by a caste or clan.
Gram Panchayat = An elected body for local self-governance at village level
Gram Sabha = A village body of all adult members whose names appear in the voter list
Johad = A small village earthen water pond
Kakad Bani = Forest on the common geographical boundary of two or three villages
Kharif = Agricultural crops cultivated during monsoon
Lok Samiti(s) = Village People’s Committee(s)
Mahila Mandals = Women organisations
Mukhia = Community chief
Padyatra = Foot March
Panch = Elected person in a gram panchayat
Panchayat Samiti = A cluster of gram panchayats
Pradhan = An elected head of Panchayat Samiti
Rabi = Agricultural crops cultivated during winter
Rakhat Basic = Forest belonged to a single villages independently.
Rundh or Balbani = A private forest protected by a landlord / jagirdar.
Sarpanch = An elected head of Gram Panchayat
Executive Summary

Introduction

All life on the earth is part of one great, interdependent system, which interacts with and depends upon the physical and biological components of the environment. Biodiversity is the source of all living material used as food, shelter, clothing, biomass energy and medicaments used by human beings. Human being is benefited from other organisms in many ways, some of which they don’t appreciate until a particular species or community disappear. Even seemingly, obscure and insignificant organisms can play irreplaceable role in ecological systems or be the source of genes or drugs that some day may be indispensable.

Our stakes in biodiversity are very high since India's economy is based on agriculture, animal husbandry, forestry and fisheries. In 1992, the UN conference on Environment & Development adopted a Global Convention on Biodiversity (CDB) to conserve biodiversity by all nations. A number of countries including India have ratified the CDB. To implement the provisions of the CDB, the Government of India initiated the process of preparation of National Biodiversity Strategy and Action Plan (NBSAP). It is being carried out at 5 different levels; local (sub-state), State / Union territory, Eco-region (inter-state), thematic and national. Arvari catchment is a sub-state site of Rajasthan.

This document describes the present status of the biodiversity of the Arvari catchment spread over about 72 villages of Thanagazi block (Alwar) and Jamuwa Ramgarh block (Jaipur) in Rajasthan covering an area of 503 sq. km and identify the factors causing deterioration of the biodiversity as per the assessment of the local communities, forest department officials, scientists, social scientists, development experts and investigating team and it includes suggestions for its conservation and improvement.

A Local Advisory Committee (LAC) consisting of 15 members drawn from different sections of the society was constituted for collection of basic information and preparation of Strategy and Action Plan. A number of meetings were organised at different places. In these meetings, besides the members of the LAC, knowledgeable local individuals,
scientists working on the biodiversity related issues, local NGO, villagers, members of women’s groups and *Arvari Sansad*, *panches* and *sarpanches* of local *gram panchayats* and local forest officials were invited to participate. Information about the present status of biodiversity in the region, problems faced by the people and possible suggestions for conservation and improvement of the biodiversity was collected in questionnaires specially designed for the purpose. A Field Survey team of nine members including local NGO field workers, knowledgeable local individuals, schoolteachers, employees of forest department, representatives of *Arvari Sansad*, experts of biodiversity (including field botanists and wildlife experts) and their services were taken for collection of information in the questionnaire. Detailed information was collected from 15 villages. Three villages, selected for case studies were *Bhaonta – Koylala* where community initiatives made success in conserving biodiversity in the region, *Samara* is a typical successful example of rejuvenation of forest through community efforts and *Kalsi – Jhiri ka Guwada*, a village suffering from excessive marble mining.

*Dr. Satish Kumar Sharma*, wildlife expert and official of forest department has done compilation of the published and unpublished research work available on the wildlife related to the area and *Mr. Ambuj Kishore* extending his assistance in the compilation of the literature from media. Subject experts and social scientists of forestry, wildlife, animal husbandry, agriculture, watershed, and medicinal plants were consulted to have technical details about different sectors of biodiversity.

**Profile of Arvari Sub-State**

*Arvari* catchment lies in the *Thanagazi* block of Alwar district and partly in *Jamuwa Ramgarh* block of Jaipur district in northeast part of *Rajasthan*. This area is receiving less than 600mm rainfall annually. Once, River *Arvari* used to flow perennially but with the continuous existing drought conditions and due to depletion of Ground Water, it dried up and the whole Thanagazi block was declared as "Dark Zone" in Government records. Village community along with a local NGO, *Tarun Bharat Sangh* (TBS) have built around 250 rainwater-harvesting structures in 72 villages in the *Arvari* catchment over the last 20 years. These structures have replenished ground water and increased the water table of the wells enabling the *Arvari* back to life and make it flow most part of the year. The rivulet, *Arvari* originates in the *Thanagazi* and terminates into a big water reservoir *Sainthal Sagar*, built by erstwhile Jaipur State in 1898 and its catchment area covers 72 villages of both the blocks in *Alwar* and *Jaipur* districts. The total area of *Arvari* catchment is about 503 sq. km. The length of the rivulet is 45 km. The area may be divided into two parts, hilly tracts and plains. The well-known *Sariska Tiger Reserve* is adjacent to the *Arvari* catchment and another important protected area in *Jaipur* district is *Jamuwa*
Ranmgarh Wildlife Sanctuary, which is adjacent to the Arvari region on the southern side. Both protected areas have rich biodiversity. Thus, Arvari region becomes important for biodiversity conservation.

Mean relative humidity during rainy weather is 63% while average annual rainfall is around 620 mm. 90% of the rainfall occurs during monsoon months (July to September). The occurrence of erratic rainfall is a common feature.

Four major communities namely Gurjars, Meena, Balais and Rajputs are prominent in this region. The hamlets of Gurjar community are found in the hilly tracts because of their main occupation being animal husbandry. Meena is a scheduled tribe community and is primarily engaged in agriculture. The area belongs to two constituencies of State Legislative Assembly and two tehsils viz. Thanagazi in Alwar district and Jamuwa Ramgarh in Jaipur district. The vegetation of the area is generally characterized as thorny scrub and sub-tropical deciduous forests. There are mainly two types of ecosystems, one natural forest ecosystem and second agriculture ecosystem. These ecosystems have been considerably affected by the biotic factors. The natural forests are now, in different stages of degradation. A number of plant and wild animal species are declining whereas some new plants species are coming up. In agricultural fields, changes have taken place in the cropping pattern and water uses. Irrigation facilities are limited. In most areas, generally two crops – Kharif during monsoon season is raised under rain fed conditions; Rabi crops are grown where irrigation facility is available. Bajra, Maize, Jawar, Groundnut, Sesame, Kali Jiri and some pulses like Mung are the major Kharif crops. In Rabi crop, Wheat, Mustard and Gram (Channa) cultivation is a common practice in irrigated lands throughout the area but Tara-Mira (Eruca sativa) Barley and Gram are also grown in rain fed areas. Several hybrid varieties of Wheat are also grown. Vegetables like Bhindi (Lady’s finger), Gajar (Carrot), Muli (Raddish), Brinjal, Tomato, Chillies, Cabbage, Cauliflower, Kaddu, Kakree, Batatas, Watermelon etc. are extensively cultivated in places where the irrigation facilities are available. Increased use of chemical fertilizers, high yielding varieties of crop seeds and use of insecticides and fungicides is being practised.

The colonial records (Imperial Gazetteer 1908) shows the area well wooded and well managed in the past. About 12% of Alwar’s land area was covered with forest. Total forest products yielded a sizeable income for the State with bamboos listed as a particularly important product for the State. In addition to forests, numerous grasslands and woodlands were under State ownership and control, though these were often opened up for village use after State’s needs had been met. After independence of the country, the control of Panchayats slackened particularly during the famine years in early fifties. In
the mid 1980s, the area of Alwar district presented a near desertified landscape. Agricultural productivity was low, causing out-migration. The hillsides of the area were largely devoid of forest cover and severe soil erosion aggravated agricultural problems and degradation of natural vegetation. Further, the Central Ground Water Board determined that extraction of ground water in the area was greater than the recharge potential and the area was thus classified as a “Dark Zone”.

The disintegration of the water harvesting system becomes significant in view of its central role and its re-establishment has played an important role in the environmental recovery in the Arvari basin. TBS activists feel that the decline in agricultural conditions was rooted in the state of decay of water harvesting structures. They hold that the loss of local control over natural resources was responsible for this. Similarly, forest cover and quality are believed to have declined as the state established control over forests and communities no longer felt a sense of ownership nor responsibility towards safeguarding these resources. Non-local agents of deforestation and mining operations, which enjoyed protection from the state, caused degradation in their own height and further alienated the local populace from their resource base. In nineties, with the introduction of the concept of JFM and launching of European Union supported Aravalli project, the forest have been re-established to some extent.

In 1986, the villagers of Bhaonta – Koylala built a huge anicut to catch the gush of rainwater from the surrounding hill-slopes from where the rivulet Arvari originates. This structure injected life into the rivulet Arvari by conserving rainwater. Since 1986, about 250 water harvesting structures have come up in 72 villages in the Arvari watershed for which community contributed about 33 percent of the total cost. These structures were collectively recharging ground water as was noticeable in the water table of the wells. This brought economic and ecological regeneration in Alwar district and a community owned system of natural resource management was evolved.

About 250 water bodies in the form of small and medium size anicuts, mud ponds (johad) and big reservoirs like Jabbar Sagar of Hamirpur village and Sainthal Sagar are now spread all over the Arvari basin. Some of these water bodies form wetlands of the area and they are quite rich in biodiversity and support a number of species of plants and animals of aquatic habitat. The livelihood of several people of the area is dependent on Sainthal Sagar, they take good Rabi crop in the catchment area and cultivate as cash crops. It supports a large population of Flamingos and other migratory birds. Some of these water bodies are under severe pressure in the marble mining area.
Current (known) Range and Status of Biodiversity

Arvari basin has mainly three types of ecosystems and ecological niches viz. Forest ecosystem, Agriculture ecosystem and Aquatic ecosystem. As per classification of forest types, by Champion and Seth (1968), the forests of this region have three main categories: Anogeissus pendula forests; Northern Dry Mixed Deciduous Forests and Desert thorn Forests.

The Arvari basin is located adjacent to the two protected areas viz., Sariska Tiger Reserve and Jamuwa Ramgarh Wildlife Sanctuary. Due to this reason also, the Arvari area becomes important for biodiversity. It also supports a large variety of wild animals like Neelgai, Sambhar, Chittal, Indian wild Boar, Indian porcupine, Indian Hare, Grew musk Shrew, Long-eared Hedgehog, Grey Langur, Rhesus Macaque (Bander), Leopard, Jungle Cat, Caracal (Syahgoh), Small Indian Civet, Small Indian Mongoose, Ruddy Mongoose, Grey Mongoose, Wolf, Jackal, Indian Fox, several species of snakes and local migratory birds. Species like Leopard, Caracal, Ruddy Mongoose, Wolf, Indian Fox, Stripped Hyena and Indian Wild Boar are rarely seen.

The successful community efforts such as Bhaonta – Koylala, Chaunshala – Padak – Chhapali and Samara have regenerated forest resources and revived wildlife in the area. The village common grazing land and some fallow lands in the past supported good growth of a number of palatable grass species such as Cenchrus biflorus, C. ciliaris, Acrachne racemosa, Desmostachya bipinnata, Apluda mutica, several species of Aristida, Eragrostis, Digitaria etc. Other important species in these lands are Dactylolctenium aegyptium, D. aristatum, Heteropogon contortus, Sorghum halepense, Saccharium benghalense, S. spontaneum and Sehima nervosum. As a result of past mismanagements, these lands are now either getting infested with thick stands of Prosporis chilensis or unpalatable weeds and grasses. Some sacred groves are having rich biodiversity and local people take care to protect some plant species. The productive potential of these lands is good and their proper management can improve them.

The major Kharif crops of the area are Bajra, Maize, Jawar, and pulses such as Mung, Oil yielding crop Sesame. Kali jiri is grown as cash crop in Thanagazi block and moongphali (groundnut) is grown in sandy plains of Jamuwa Ramgarh block. In Rabi crops, Wheat, Barley, Gram and Mustard are commonly grown. In the region, local farmers created and perpetuated gene pools by natural selection. The ‘Jhakharana’ variety of Bajra (pearl millet) and Dholi, Sathi varieties of Maize, Safed Lal variety of Jawar is being perpetuated through natural selection. Deshi (indigenous) varieties of Wheat are still grown in the areas where adequate irrigation facilities are not available. The farmers prefer to grow local varieties of cereals for their family consumption because
of their good taste. A number of new improved and high yielding varieties of seeds developed for agriculture crops have been introduced in the area also. Introduction of these varieties substantially increased the productivity of crops. To maintain the productivity of the soil, the farmers have to put in chemical fertilizers as well as farmyard manure in good quantity. The use of chemical fertilizers, pesticides / insecticides is increasing which is causing adverse effect on soil micro flora and fauna. This is resulting into degradation of the natural fertility of the land.

In some part of the Arvari basin, some species of fruit plants are grown such as Mango, Amrood, Aonwla, Papaya and Nimbu, which are having good food and economic value. Some cultivators have started commercial cultivation of fruit plants like Aonwla and Nimbu. Common domestic animals are buffaloes, cows, goats, sheep, camel and they make a major contribution in the economy of the people of the area. They not only provide drought power but also valuable manure for the agricultural fields and food for the people in the form of milk, milk products and meat. Dead animals provide skins and hides. People of the area generally maintain large number of cattle. The important breeds of cows are Haryana and Mewati. Murrah and Surti are amongst the good breeds of buffaloes. All people of the area rear goats, because of their hardiness and low maintenance costs. Important breed of the goat is ‘Jakharna’. This breed is found in Jakharna village of Alwar district. Sheep and wool make substantial contribution to the economy of the people. Some good breeds of sheep reared in the area are Chokla, Nali and Malpura. Generally, local breed of birds, deshi-murgi are reared by poor sections of the society for their own consumption.

**Statement of Problems related to Biodiversity**

Main reasons for the loss of biodiversity in the forest areas are: biotic pressures, increased population and expansion of human habitations, excessive cutting of trees for fuel wood and furniture making and uncontrolled grazing by cattle adversely effecting natural regeneration of plants, deterioration of traditional social systems and cultural values for protection of sacred groves (Orans) and totem trees, politicization of gram panchayats, unscientific marble mining and introduction of exotic species. The wild animals have been suffering because of hunting and degradation of natural habitats. Unrestricted use of pesticides in agricultural crops is causing deaths of natural predators of agricultural pests. In recent years, increasing population of Nilgai (blue bull), is causing heavy damage to the crops of the villagers and alarming expansion of Prosopis chilensis is reducing growth of herbaceous species and adversely effecting the growth of indigenous species.
The production of indigenous/local varieties of agricultural crops has suffered significantly because of government policies of promoting the high yielding varieties of seeds along with chemical fertilizers and pesticides and providing irrigation facilities at subsidized rates. The production of local varieties of cereals has also been affected by change in food habits of the people and market demand and consumption pattern. Loss of domesticated animal biodiversity is mainly because of mechanization of agriculture, improved transportation facilities making the animal drought power secondary.

Major Actors and their Current Roles Relevant to Biodiversity and Ongoing Initiatives: The local society is considered as important stakeholder and plays an important role in the natural resource management and biodiversity conservation. Its different sections have different utilization patterns, conservation options and priorities about biodiversity. As perceived from the community interactions, there are ten major user groups on the basis of their relationships with the existing biodiversity. These user groups are Farmers, Pastorals, Fuel wood, Fodder and Green manure, Wild vegetable and fruit, Gum collectors, Herbal healers, Village priests, Labourers or seasonal migrants and Artisans. All user groups are related with agriculture and animal husbandry directly or indirectly as well as cultural, environmental, religious, subsistence and medicinal value of biodiversity.

An NGO, Tarun Bharat Sangh has been working for mobilising people of the area for their own resource management for the last 20 years and creating awareness towards biodiversity conservation of the area. With the support of TBS, local community initiatives have achieved exciting success in regeneration of forests, reviving wildlife and traditional system of water conservation. TBS, seeing the degradation of forests and lowering of the water table in the area, motivated the villagers to construct rainwater harvesting “Johads” around which life thrives and simultaneously protect the natural forests. These Johads got filled up with rainwater during monsoon and provided much needed relief to the villagers. Seeing success, a chain reaction started in the area. The villagers started making their own rules and regulations for village resource management and in several villages, people resolved not to carry any axe inside the forests. The forest cover has started reviving again and even the wild animals have also staged a come back. The wooded hill slopes and Johads collectively recharge the ground water in the area.

National Forest Policy enunciated by the Government of India, from time to time and Forest Act have played an important role in conservation of forests all over the country. The Policy of the Government of India (1988) lays emphasis on meeting the domestic requirements of fuel wood, fodder, minor forest produce and construction timber of the people living in the forests. The new policy emphasizes that these items or
substitute materials should be made available at reasonable prices. This was a marked shift in the policy at National level in the management objectives of the forests. The shift was from meeting the commercial demands of the forest products and maximising the state revenue to meet the local needs of the people. Another shift was involvement of the local people in the protection and management of forests by constituting Forest Protection and Management Committees. The GOI, in pursuance of the new forest policy issued detailed guidelines for a massive people’s movement for protection, development and management of degraded forests by involving the local communities on June 1, 1990. The externally aided projects for afforestation of Aravallis (*Arvari* is also a part of Aravallis) were implemented by involving VFPMCs under JFM programme in the state of *Rajasthan*. Because of the involvement of the local communities in all the stages, right from micro planning to the completion of plantation and its subsequent management, encouraging results have been seen. These afforestation projects have substantially increased the supply of forest produce from the areas and have led to an economic emancipation of under-privileged group especially women who have benefited from the increased supply of fodder, fuel and other non-timber forest produce.

The forest department is presently-providing protection to wildlife and its habitats. Although a number of wild species are on the fringe of extinction in the area, still no research work is being undertaken to study their ecological status. Increase in the populations of some of the wild animals like *Nilgai* is causing problem to the farmers in the area.

The Agriculture department is emphasising on availability of quality and improved seeds of high yielding varieties to increase the production. However, the department is not in any way providing incentive to the cultivators for growing indigenous varieties of crops and other land races. Intensive agriculture with irrigation with tube-wells is lowering the underground water table in the area. In the *Arvari* basin, farmers are practicing agro-forestry by protecting the natural growth and regeneration of trees and shrubs on the field boundaries and planting saplings of trees like *Ardu* (*Ailanthus excelsa*) for fodder, *Neem* (*Azadirachta indica*), *Shisham* (*Dalbergia sissoo*), *Deshi babool* (*Acacia nilotica*) for multipurpose use. These trees provide additional income to the cultivators.

**Gap Analysis**

India has a land based economy, so the importance of biodiversity becomes much more crucial for the sustainable development. The policy makers and those who are engaged in decision making at various levels have not fully understood the value of biodiversity conservation not only for better future generation but also for the present
scenario. The basic problems such as poverty alleviation can be tackled through conservation of biodiversity and also to achieve sustainable development of bio-resources for future generation. Development of the area is generally associated with providing electricity, roads, irrigation etc. and the development of natural resources like conservation of rainwater, forests and pastures generally gets a backseat. This is mainly because of the lack of informed vision at all levels. Although, Arvari catchment and the surrounding area is rich in biodiversity but has not been fully explored. No systematic surveys and ecological studies of threatened and endangered animals, impact of development activities and mining operations, effect of fertilizers used extensively in the area and pesticides, introduction of exotic species and community initiatives etc. have not been undertaken. Information about the status of medicinal plants, their productivity and exploitation is totally lacking.

Drought is a common feature in the area. The state government, in order to provide relief work to the drought-affected people undertake employment generating relief works, preferred construction of roads. They do not contribute much in combating the future droughts. Very low priority is given to the afforestation works and construction of rainwater harvesting structures. The importance of grasslands in the rural economy primarily based on agriculture and animal husbandry has not been properly visualised by the state. Community aspirations for its livelihood aspects are not given due weightage while visioning the development programmes by the government functionaries. A study of legal implications of community-based conservation (Upadhyay 1999) mentions that forests and wildlife laws in the state of Rajasthan have very few statutory provisions that facilitate community participation. The central constitutional amendment could provide direct involvement of local participation in management and preservation of natural resources but the Rajasthan Panchayat Raj Act which followed the central legislation, does not give much power to the village institutions regarding management of local natural resources. There is a need to review the wildlife protection Act to provide for creation of protected areas with involvement of local communities and safeguarding their traditional rights over its benefits and also the need for an institutional structure for bringing the stakeholders together on a regular basis.

**Strategies Suggested to fill Gaps and Strengthen the Ongoing Measures**

Addressing the socio-economic aspirations of the people is the only way to create personal stakes in the maintenance and sustainable use of the biodiversity. Strategies suggested are based on a system of decentralized governance in conjunction with CBOs, NGOs and State Departments. The functioning mechanism of the involved agencies in the decentralized model would be participatory, transparent and accountable to the local
Communities. Based on these assumptions and filling gaps, the specific strategies include:

- Creation of awareness, formation and strengthening community groups and building their capacity for dealing with biodiversity issues;
- Restoration of degraded forests giving high priority to natural regeneration;
- Improving nursery and agro-forestry practices;
- Increasing the productivity of indigenous species;
- Propagating cultivation of medicinal plants for local consumption and exploring market system;
- Eradication of exotic noxious weeds;
- Developing and improving grasslands;
- Improving habitat of the existing protected areas and strengthening the protection machinery;
- Giving top priority to forestry, construction and maintenance of water harvesting structures and pasture land development while taking up drought proofing and famine relief works. The biodiversity conservation interventions be weaved around conservation of water and livelihoods of the local people.

The strategy also emphasizes for agricultural biodiversity on ensuring government support in the form of minimum support price for cultivation of indigenous / land races relating to different crops, encouraging and educating farmers for producing Vermicompost for enhancing organic farming and documenting traditional wisdom and skills of the people.

Mining in all ecologically sensitive areas to be stopped. An independent body to be constituted to assess the impact of mining on biodiversity and livelihood of the people and take steps to check its ill effects and ensure safe disposal of the overburden waste from the mining activity. Reviews of existing policies and regulatory frameworks relating to conservation of biodiversity be undertaken from the point of view of preservation of bio-resources and local livelihoods. Biodiversity to be made a part of school curriculum. Poverty alleviation programmes to focus on skill improvement of economically deprived people.
Suggested Actions to fill Gaps and Strengthen Ongoing Measures

Based on identified gap and proposed strategies, actions have been suggested to enhance / strengthen community oriented ongoing measures supported by government as well as NGO. A total of 26 action plans have been proposed. Seeing the need of taking immediate steps to address key issues such as survival of wild life, livelihoods of inhabitants and combating drought situations 11 actions points have been recommended in the category of high priority and remaining points in the category of medium priority. Seven points are related to capacity building and empowering people’s organisations such as Arvari Sansad, Gram Sabhas (Lok Samitis), Women’s groups, JFMCs etc. for sustainable natural resource management and dealing with critical biodiversity issues. Next eight actions have been proposed to undertake assessment studies on various aspects of biodiversity and impact of various development activities on livelihood of the people and ecology of the area and dealing policy and legal issues in the interest of the people. Ten actions have been suggested for formulation and implementation of development schemes for addressing people’s livelihood and biodiversity conservation issues. Last two actions are to integrate biodiversity components in school curriculum.

Operational Implementation of the Action Plans and Follow-up

The proposed Strategies and Action Plans would be implemented through collaborative efforts of several community-based organisations like Arvari Sansad, PRIs, Women’s groups etc. and government departments. Tarun Bharat Sangh, a local NGO will have the core responsibility of capacity building of people’s groups, orienting government functionaries in community base4d, participatory approach of natural resource management, overall coordination and monitoring of the implementation of the action plans.

For successful implementation of the action plans, TBS and government departments will jointly mobilise adequate financial resources to support the activities. Most of the activities will be implemented through Arvari Sansad and gradual process will be evolved to shift key roles and responsibilities from TBS to Arvari Sansad over a time of five years. The forest department would be an active partner in the entire process of the implementation of BSAP and also in the follow-up actions. Detailed implementation and monitory schedule for each action will be worked out in the beginning of the project by concerned agency.
CHAPTER 1

INTRODUCTION

1.1. Background

All living beings in any particular area form the biodiversity of that area. The term biodiversity refers to the variety and the variability among the various living organisms, the ecological complexes in which they normally occur and the ways in which they interact with each other and the geo-sphere. It is the product of millions of years of evolution and can be divided into three hierarchical categories: genes, species and ecosystems. Diversity of species and genes affect the ability of ecological communities to resist or adapt from the disturbances and environmental changes including long-term climatic changes. Genetic diversity within species is the ultimate basis of evolution, the adaptation of wild population to the local environmental considerations and development of animal breeds and cultivated crop varieties, which yield significant, direct benefits to humanity (Seva Mandir, 2001).

The survival of human population is dependant on biological diversity. This biological diversity is part of our daily lives and livelihood and constitutes resources upon which familiar communities, nations and future generations depend. Biodiversity has numerous values in agriculture, medicine, food and industry. It maintains ecological balance, sustains evolutionary processes and has spiritual, cultural, aesthetic and recreational values. The services rendered by the ecosystem include pollination, chemical cycling, nutrient cycling, soil maintenance and climatic regulation.

Conservation and sustainable use of biodiversity has been an integral part of traditional Indian culture. Even today, a large number of people derive their daily livelihood sustenance from forests, rivers, grasslands etc. The practices and beliefs of forest-dwelling tribes, nomadic communities and farmers remain closely intertwined with the biological diversity they live amidst. The cultural diversity of this nation is largely an outcome of the diverse ways in which different people living in different parts of this country relate to the different kinds of plants and animals they are surrounded with.
Threats to biodiversity are numerous and these are increasing day by day. The most serious threats to biodiversity are in the forms of habitat destruction and over exploitation of resources. These are the direct and more immediate causes for decline in the biodiversity. Biodiversity today stands threatened not only in terms of species richness, distribution and habitat destruction but also in terms of knowledge and concern about it. There is considerable erosion in the traditional and wisdom knowledge among the younger generation. In the worldview of people, biodiversity conservation does not feature as an option. Instead, people aspire to achieve such means and alternatives, which would yield them, secure returns over a shorter time frame. Despite being a witness to the steady onslaught of degradation, the people feel disinclined to take a proactive role to reverse the trend. They opine that conservation is the prerogative of the state. Moreover, they feel at a loss to suggest measures to address this problem, as they have not been consulted in this regard for a long time now. The state policies of conservation have tried to address these threats as reflected through the conventional approaches to conservation viz., Imposing regulations / restrictions on use of biodiversity areas and keeping people out of the conservation process. However, little attempt has been made so far to probe into the underlying socio-economic-political factors behind biodiversity loss.

With increase in human and cattle population, the natural resource base has come under stress, so much so that dense forests have been reduced to scrub areas with loss of valuable species which once thrived in the area. The livelihoods of the people linked with collection and sale of minor forest products have become economically unviable. Thus, people assign a low priority to conservation. There has been an alienation of the people from the natural resources due to the centralised decision making, policy structures etc. Because of this, people tend to lose a sense of belongingness with the natural resources on which they depend to a very large extent. The increased biotic stress and declining resource status has led to a loss of people’s livelihood sustenance based on natural resources. This has compelled them to look for alternatives in the market in the form of wage employment or commercial exploitation of forest products. Thus, people are in the race of gaining better livelihood options at the risk of misuse of biodiversity. Consequently, the mindset of people has become centred on incentive-based, short-term use values rather than conservation-oriented, long-term, existence value of biodiversity. Wherever traditional
conservation efforts by the community were in practice, they lost ground as the control of these areas got vested with the state. As the state showed little regard to the conservation ethos and initiated exploitation of these lands, the community’s faith in the upkeep of these areas also dwindled.

In cases where the local people initiated conservation efforts in the form of organised resistance against the practice of illicit encroachments of common property resources and their de-facto privatisation, they lost out in the absence of a clear state policy in this regard. The state’s stand on allowing this loss of commons to continue in an ad-hoc manner, on one level acts an incentive for encroachers to legalise their claims by whatever means and dampens the conservation ethos of the community on the other. At another level, it not only threatens the physical status of the biodiversity housed on these lands by their conversion from forest / pastures to crop lands, but also the livelihood systems of various marginalized groups in the village who sustain on gathering and collection of fruits, NTFP etc from these commons.

The problem of conservation is a complex one. However, till date, it has only been addressed through state measures like creation of protected areas, curtailment of community rights over resources, zero level of human interference in conservation areas, focus on priority plant and animal species and keeping conservation as a state controlled agenda. The protected areas have been successful in staving off threats. This reveals that state efforts have definitely not been adequate and in many places, even where successful, have created other problems like conflicts with local communities (Seva Mandir, 2001).

It is evident that in order to address the problem of biodiversity conservation, there is need to understand the priorities of the local people with regards to conservation and the process involved in motivating them to take up conservation on a sustained basis. Thus, there is no shortcut to conservation. The way out of this is to address the socio-economic conditions that cause deprivation amongst communities and create personal stakes in the maintenance and sustainable use of biodiversity (Seva Mandir, 2001).

To prevent continuing genetic erosion and to promote concerted effort to conserve biodiversity by all nations, acting both individually and collectively, a United Nations Convention on Biological Diversity (CBD) was adopted at the UN conference on environment and development in 1992. It came into force in

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December 1993. So far, over 174 countries including India have ratified the CBD. It provides a framework for integrated action in biodiversity conservation, sustainable use and equitable sharing of the benefits. To implement the provision of the CBD, the government of India initiated the process of preparation of *National Biodiversity strategy and Action Plan* (NBSAP) in the year 2000. It is being carried out at five different levels: local (sub-state), state / union territory, eco-region (inter-state), thematic and national (Sharma, 2002).

**1.2. Scope**

The present document defines the status of biodiversity of the *Arvari basin* of *Rajasthan*. It suggests *Strategy and Action Plan* (SAP) for its conservation and sustainable use. The *Arvari* region lies in the *Thanagazi* block of *Alwar* and *Jamwa Ramgarh* block of *Jaipur* district in *Rajasthan*.

Climatically, the area is semi-arid with a meagre 620 mm of average annual rainfall. The forest, in this region, are deciduous in nature, most trees having shrub like appearance with low height, small leaves, thorny branches and stems so typical of desert vegetation. The present status of natural vegetation and its biological diversity in *Arvari catchment* is extremely poor and so disrupted that it is difficult to even assess it properly. This destruction of biodiversity has also been caused by many factors and reasons, but policies and laws introduced and enforced by government play a significant role in this regard. Almost all government policies, rules, regulations and schemes end up working in a negative direction, especially at grass root levels (Singh, 1997; Upadhyay, 1999). Today, even in traditional communities and village institution the traditional system of conservation and management of natural resources stand seriously deteriorated. The new value system and the enforced State control over the land has placed communities aside and away from the management of natural resources and conservation of both flora and fauna.

In the SAP for *Arvari catchment*, the different levels of biodiversity in the context of the issues like conservation, sustainability, equitable use encompassing the scientific, economic and cultural dimensions, an attempt has been made to cover the entire range of biodiversity available in the area in form of natural eco-system, agriculture eco-system, wetlands including the animal biodiversity (wild as well as domesticated). The document also covers people's perception about
biodiversity and the practices adopted by them for its conservation. It also tries to document socio-economic and cultural ways related to nature.

Biodiversity is not homogeneously distributed in the region. Some patches have many and concentrated species whereas others have few and scattered. Various user groups have different priority for conservation of different patches of biodiversity. As such an effort has been made to study and investigate how various components of biodiversity are distributed, utilised and need conservation in different patches belonging to various habitat types. Presently, it appears that the community initiatives supported by external agencies through strength building of the community could serve to regenerate the natural resources and result in the revival of the richness of the biodiversity of the area. Although, the people of the area are organised for a sustainable management of the natural resources, but they have achieved very little success. In some pockets of the region, the overall status of the biodiversity in all its forms i.e. wild as well as domesticated is on the verge of decline.

Some successful community initiatives (such as *Bhaonta-Koylala*) could be expanded to larger areas through strength building of *Arvari Sansad*. A joint Action Plan could be worked out with community and Forest department for implementing the SAP.

**1.3. Objectives**

The objectives of this BSAP are:

- To investigate and document the present status of biodiversity in the *Arvari* catchment.
- To identify causes of deterioration of biodiversity in the region.
- Strategise to stop the degradation of the natural resources and attempt to restore those resources that have disappeared / degraded and the ecological status.
- To revive the best traditional practices and indigenous knowledge of the people for conserving the biodiversity and physical environment.
- To involve the community people in day-to-day biological resource management by creating their stakes in its management and its judicious utilization of the resources.
• To evolve a process of resolving conflicts between different stakeholders (especially forest deptt. and community) on issues of land, forest and water.

• To preserve the land races by providing some economic incentives to the farmers for cultivation of such crops.

• To promote sustainable utilisation of natural resources for meeting their needs of fuel, fodder, material for housing of the local people, raw material for a wide range of cottage / rural industries, medicines and genetic resources for agriculture.

• To inculcate a positive attitude among the community people towards conservation of biodiversity of the area and to make them aware of the appropriate use of science and technology for the NRM.

• To identify legal and financial measures necessary for promoting awareness and conservation of biodiversity.

• To promote coordination between different stakeholders including government, public institutions, community groups, women groups etc.

• To establish a process of training and research for the continuous strength building of the people for NRM.

• To prepare an Action Plan based on the needs and aspirations of the community people including the women and the downtrodden sections of the society.

1.4. Contents

This SAP document describes the present status of the biodiversity of the Arvari catchment sub--state spread over about 72 villages of Thanagazi block (Alwar) and Jamwa Ramgarh block (Jaipur) in Rajasthan covering an area of 503 sq km and identify the factors causing deterioration of the biodiversity as per the assessment of the local communities, scientists, social scientists, development experts, NGO(s), forest department officials and investigating team. It covers mainly the following components:

• Present status of natural biodiversity (including both floral and faunal elements). Reasons for its degradation, approaches evolved by the local
... communities for the restoration and conservation of forest and wildlife and revival of traditional relationship between the people and the forest.

- To study the changes in agricultural biodiversity and to examine suggestions elicited from the community people through interaction for conservation of land, races and fertility of the soil.

- Present status of domesticated animals and fisheries; causes of degradation and suggest measures for improvement in the livelihood status of the people.

1.5. Methodology

Executive Director and General Secretary of Tarun Bharat Sangh, Shri Rajendra Singh constituted a Local Advisory Committee in consultation with Shri Kanhaiya Lal Gurjar, the convenor of the Arvari Sansad (Annexure III) consisting of members from different sections of the society. He identified Dr. O P Kulhari as a coordinator for Arvari BSAP preparation who has experience of TBS approach, Arvari region and knowledge about the biodiversity. Mr. Kanhaiya Lal Gurjar, the convenor of Arvari Sansad was asked to extend his cooperation in the entire process of BSAP preparation. This was done in consultation with Ms. Kanchi Kohli and Ms. Bansuri Taneja of Kalpavriksh. The coordinator firstly tried to understand the objectives and conceptual framework of the project by organising detailed discussions with the members of technical implementing agency, Kalpavriksh and TBS executive director. Then, a tentative Work-Plan for undertaking the activities in a phased manner was worked out.

The broad objectives of the National Biodiversity Strategy and Action Plan (NBSAP) and suggested format of Strategy and Action Plans (SAPs) were kept in mind while selecting or designing particular methodology. As a first step a series of discussion meetings (both formal and informal) were organised with the TBS faculty members, field workers, officials of forest departments and representatives of PRIs, members of Arvari Sansad and stakeholder (including both men, women and farmers). This effort was followed by consultations with experts, scientists including (social scientists), economists, wildlife experts, botanists and zoologists. As a result of these interactions a specific planning was done to undertake field study. It was considered necessary to adopt a participative approach to collect information.
1.5.1. Field Study

Following are the steps involved in the field study:

- **Formation of Field Survey Team:** The survey team comprised of two members of *Arvari Sansad*, one TBS field worker, one wildlife expert, one field botanist (floristic expert), one zoologist (researched on sacred groves of the area). This team was laid with one field coordinator who was senior TBS worker but he was closely assisted by one of the team experts in planning and documentation (*Annexure I*).

- **Formation of Format:** Before the commencement of the actual fieldwork, it was necessary to prepare a detailed format to collect data and information for each village (villages selected for case studies). A list of open-ended / semistructured questions was prepared for focussed group discussion (FGD) for the village level community meetings (See Field Survey Format in *Annexure VIII*).

- **Selection of Villages for Case Studies:** It was decided in a meeting between TBS faculty and representatives of technical group for NBSAP (*Kalpavriksh*) that a sample of three villages should be selected for detailed village level case studies and that the selected villages should be representatives of the entire region. The following were the selected sample villages, the names of which were suggested by some of the LAC members:
  
  - *Bhaonta-Koylala* where community initiatives made success in conserving biodiversity in the region.
  
  - *Samara* is a typical successful example of rejuvenation of forest through community efforts that have recently begun.
  
  - *Kalsi Kala – Jhiri ka Guwara* is a village suffering from excessive Marble Mining.

In the first meeting of the sub-state LAC on 23 May 2001, the members felt it necessary to do a detailed study of three more villages. For this, *Khaidata, Sainthal Sagar (Borunda)* and *Dumoli Khatala* villages were identified. The task was assigned to two members of the LAC, *Mr. Virendra Singh* (school teacher) and *Mr. Kanhaiya Lal Gurjar*, convenor of *Arvari Sansad*. They prepared detailed profiles of these villages in a period of two and half months. The TBS field workers
and Arvari Sansad members had some rapport with the community people of these villages and the methodology was built on this rapport.

**Preparation for Field Kits, Equipments and Stationery required for the Survey:** The bulk of the investigations were carried out by field studies in the Arvari region. Actual contact was made with the local communities and information, suggestions / perceptions taken directly from them. Advance planning, studies, arrangement and preparation preceded the field visits.

The following articles were ensured in the field kit:

- Plant collecting equipment (for identification of plants which were not identified on the spot).
- Equipments required for documentation were Camera, Tape recorder, Field Diaries, notebooks, slip pads etc.
- Pencils, Erasers, Blades, Measuring tape, Magnifying lens were included in the kit, which helped accessing reliable information in easy manner. Other miscellaneous items such as torch, candles, matchboxes etc were found useful in some way.

**Field Work:** The entire team had done extensive fieldwork from early morning to late in the night for four days (17-20 December 2000). They travelled by Jeep or Motorcycles. The team members had organised several meetings with community people during early morning or late evenings since in daytime people were found in their livelihood chores. Rapport with the local communities was established for seeking their cooperation for collecting information of biodiversity. The problems faced by them, their perceptions, valuable suggestions were recorded and later on processed, field notes were taken regarding the flora and fauna (including small animal world like termites, insects, spiders, ants etc.). To make certain that no details or observation taken during the day were forgotten, daily report was written at night.

**Photographs:** The landscape of the area surveyed, common & rare plants and persons interviewed were photographed.

**Tape Recordings:** A pocket tape recorder was employed for recording the interviews. For recording, C-90 Cassettes were preferred.
1.5.2. Public Participation

Several discussion meetings with farmers, members of *Arvari Sansad*, *gram sabhas*, women’s groups, teachers and students in 13 villages and public hearing cum workshops were organised for seeking cooperation and eliciting perceptions of different sections of the society including village communities.

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**Box 1**

**Community Interactions**

The issue that emerged from the interactions held with the local people during the meetings organised in 13 villages of the region and the information provided by the members of *Arvari Sansad* and from other sources are as follows:

- People faces survival problem in the marble mining areas and a high loss of biodiversity.
- Reduction in the forest area when local community is not involved in its management.
- Adverse effects of introduced exotics in the forest / village common lands.
- Mechanisation and modernisation of agriculture and increased use of high yielding varieties of seeds, insecticides / pesticides and chemical fertilizers.
- Hunting of wild animals and migratory birds by outside people e.g. in *Sainthal Sagar*. Several migratory birds come here and are killed by outside poachers.
- Management of the ground water for irrigation purposes.
- Ignorance of the traditional wisdom and knowledge of the people for the management of natural resources. In *Sainthal Sagar*, community is not involved in its management and total control over it is that of State government department.
- No legal status given to the community organisations like *Bhaonta-Koylala* and *Arvari Sansad*, which made successful efforts for sustenance and regeneration of forest and other resources.
- Increasing population of *Neelgai* (*Rojda*) is causing heavy damage to the crops.
- Contract (*Thekka*) for cultivation of *Kamalgatta* and fisheries in the water bodies of the region.
- Ownership of the forest resources under the ‘Forest and wildlife Conservation Act’.

*(Annexure IV)*, local artisans, knowledgeable persons (Ayurvedic practioners and traditional medicine persons), women groups, biodiversity experts, planners,
social activists, scientists, media persons. The active involvement of the members of *gram panchayat*, government officials especially of forest, agriculture, irrigation, mining, watershed development, education departments etc. was sought in the process of BSAP. In the entire process of BSAP, periodic consultations with a representative (*Ms. Kanchi Kohli*) of coordinating (Technical Implementing) Agency, *Kalpavriksh* proved very useful for bringing the draft in the present shape (*Annexure IVa and IV b*).

1.5.3. Consultation of Secondary Sources

All proceedings of *Arvari Parliament (Sansad)* and literature of *Tarun Bharat Sangh* published on various issues of biodiversity, natural resource management, community and NGO initiatives, published and unpublished research material and reports of forest department and scientists working in different research organisations were consulted and relevant information was compiled from these sources for the BSAP draft. The list of references has been given in Chapter 11.
CHAPTER 2

PROFILE OF ARVARI CATCHMENT

2.1. Geographical Profile

*Arvari* catchment lies in *Thanagazi* block of *Alwar* district and partly in *Jamwa Ramgarh* block of *Jaipur* district in *Rajasthan*. *Alwar* district is located in the northeast of *Rajasthan*, Western India, between 27° 15′ and 28° 15′ North latitudes and 76° 15′ and 77° 0′ East longitudes. Temperatures of the area fluctuate from 0° C during some cold winter nights to as high as 49° C during summer season. Mean relative humidity during rainy weather is 63% while average annual rainfall is around 620 mm. 90% of the rainfall occurs during monsoon months (July to September).

The river *Arvari* originates in the *Thanagazi* block of *Alwar* district of *Rajasthan*. The northern catchments area of the river is around *Kankad-Ki-Dhani*. Of the two sources of the river, one source stream originates near the village *Bhaovta* and the other source stream originates near the village *Agar*. Also, near the village *Amka*, there is a third stream, quite close to the second one, that gets lost in the ground, *Pratapgarh* road at a place called *Palasana-ka-Pahad*. From this point onwards, the river is known as *Arvari*. This rivulet runs down to the village *Hamirpur* and meets *Nahar-Nala*, a stream from the west. At this place, TBS has built a small dam whose length is 500 feet and the height is 11 feet. The small lake, the dam forms, is named *Jabbar-Sagar*, whose submergence extends up to 3 kms upstream. The ever-flowing water now makes its way downstream and meets *Samrawala-Nala*, a stream coming from the East, just north of the village *Samra*. Another stream called *Gijro-ki-Dhani*, which too comes from the East, meets *Arvari* south of Samra. A western stream, named *Nijrawali-Dhani*, also joins *Arvari* north of the village *Kaled*. The water flowing over the *Kunj Sagar* dam continues its course downstream and leaves *Thanagazi* block of *Alwar* district and enters into the *Jamwa - Ramgarh* block of *Jaipur* district near the village *Basi*. South of *Basi*, comes another sizeable stream from the village *Dagota*, which is located in the *Jamwa - Ramgarh* Wild Life Sanctuary of the *Jaipur* district. The stream joins and augments the river *Arvari*. The augmented river *Arvari* further joins an equally big tributary near the place called *Ramewala* –
the tributary having its origin around the village *Lothabas* in the West and then passing through the *Jaitpur-Gujrun, Rasayawala* and *Rayanwal* regions. By this time, *Arvari* becomes a river in her own right and gets lost in her own big reservoir, *Sainthal Sagar*, which came into existence due to a large dam on the same river (*Patel, 1997*). *(See details in Map of Arvari Watershed)*.

The area may be divided into two parts, hilly tracts, and plains. The well-known *Sariska* Tiger reserve is adjacent to the *Arvari* catchment and another important protected area in Jaipur district is *Jamwa - Ramgarh* Wildlife Sanctuary, which is adjacent to the *Arvari* region on the southern side. Both protected areas have rich biodiversity (*Sharma, 2000*). Thus, *Arvari* region becomes important for bio-resource conservation. Total area of the *Arvari* catchment is about 503 sq. km. The length of the rivulet *Arvari* is 45 km.

### Box 2

**Sainthal Sagar**

The *Sainthal Sagar* is a traditional water reservoir constructed by erstwhile *Jaipur State* in 1898 and is located on the boundary between *Jaipur* and *Dausa* districts but it comes under the control of revenue department of *Dausa* tehsil. The total catchment area of the reservoir is 118 sq. mile and its command area is 3228 acres. The maximum water level is RL 90 and the water storage capacity is 484.80 MCF. The length of Waste Weir of the dam is 1085 ft, the length of north canal is 210 chains, and that of south canal is 250 chains. The area is shelter rich bio-diversity and wildlife. *Sharma and Kulhari (2000)* reported 213 species of birds; it is an important wintering ground of a large number of waterfowls including a variety of migratory birds like Barheaded Goose (*Anser indicus*), Greylag Goose (*A. anser*), Rudy Shelduck (*Tadorna ferruginea*), Pintail (*Anas acuta*), Mallard (*A. platyrhynchos*), Shoveller (*A. clypeata*), White Pelican (*Pelecanus onocrotatus*) etc. Langur and Rheus monkey are pre-dominant species of mammals. Plant species such as *Phragmites Karka*, *Typha angustata*, *Nelumbo nucifera* and *Azola fern* commonly occur in the aquatic habitat of the region and provide shelter to several wild species of animals.

*Nabala ki Nadi* is flowing in the down stream of *Sainthal Sagar*. An anicut has been constructed on this river where water is available round the year. The livelihood of several people of the area is dependent on *Sainthal Sagar* because they take good *Rabi crop* in the catchment area and cultivate vegetables as cash crops.
2.2. Socio-economic Profile

Most of the ethnic groups and subgroups of Indo-gangetic plains are found in this region (Patel 1997). But four major communities, namely Gurjars, Meena, Balais and Rajputs are prominent in this tract. According to the norms of traditional social hierarchy, Rajputs occupy the highest position in the society; the Gurjars, second and the Balais, the lowest. While the Rajputs, Meenas and Gurjars share ties of commonality they do not eat and drink with the Balais. In the past, this hierarchy was reflected in the economic condition of each community. The Rajputs, as ‘Jagirdars’ (landlords who during the princely times had been awarded lands by the State and were exempted from paying taxes) of the area controlled most of the resources. The Gurjars, Meenas and Balais were dependent on the Rajputs for employment, waiving of loans and revenue. The hamlets of Gurjar communities are found more in the hilly regions because their main occupation is animal husbandry. Meena is a scheduled tribe (ST) of the area and is primarily engaged in agriculture. However, after agriculture, animal husbandry is the second occupation of Meena tribe. Gurjars are nature lovers and prefer wilderness for their habitat. The average land holding per household is between 1 and 1.5 hectare, while the number of cows and buffaloes range from 10 to 15 per household. Both Gurjars and Meena have direct dependence on forest resources including grass, fuel wood, leaves, honey etc. Both communities are known for their interest in conservation and their traditional skills, strength and self-discipline. The total population of the area is about 70,000.

2.3. Political Profile

Arvari catchment is spreading in Thanagazi block of Alwar district and Jamwa Ramgarh block of Jaipur district. There are 72 villages in both the blocks, out of which 38 villages are located in Thanagazi block while the remaining in Jamwa Ramgarh block. There are two constituencies of State Legislative Assembly, one for Thanagazi and second for Jamuwa Ramgarh.

2.4. Ecological Profile

Climatically, Arvari basin is semi-arid with a meagre 620 mm annual average rainfall. It has mainly two types of ecosystems and ecological niches viz.
Forest Ecosystem and Agriculture Ecosystem and a number of small and medium size waterbodies.

2.4.1. Forest Eco-System: As per classification of forest types by Champion and Seth (1968) the forests of this region has three main categories:

- Anogeissus pendula forests
- Northern Dry Mixed Deciduous Forests
- Desert thorn Forests

Patel (1997) described as thorny scrub and subtropical deciduous forests in the area. It can also be classified into the following categories according to landscape types: (i) Hilly tracts (ii) Plains (iii) Water bodies (iv) Sand dunes (v) Road-sides, parks and residences. Most trees occurring in plains and sand dunes are having shrub like appearance with low height, small leaves and thorny branches and stems so typical of desert vegetation. The forest of the area is now found in different stages; some are degraded due to over exploitation/grazing and a few are regenerating through community/ community-forestry department joint efforts.

2.4.1.1 Flora: The most common species found in the hilly tracts is Dhok (Anogeissus pendula), a slow growing tree species with a height of up to 12 metres. Due to continuous hacking and grazing, this species has been reduced to scrambling bushes. On the higher slopes and plateau Salar (Boswellia serrata) and Dansaria (Rhus mysurensis) are found. The other common species are Gurjan (Lannea coromendalia), Khair (Acacia catechu), Khairi (Acacia senegal), Jhari (Ziziphus nummularia), Tendu (Diospyros melanoxylon), Jhinjha (Bauhinia racemosa), Kakoon (Flacourtia indica) etc. A most common shrub Ardusa (Adhatoda zeylanica) is found growing gregariously on degraded foothills. The most common tree species in plain area are Deshi babool (Acacia nilotica), Roonj (Acacia leucophloea), Khejri (Prosopis cineraria), Ker (Capparis decidua), Arni (Clerodendrum phlomoides), Murali (Lycium barbarum), Kankera (Maytenus emarginata), Hingota (Balanites aegyptiaca) etc. Perennial herbs and shrubs like Munj/Kuncha (Saccharum bengalense), Kans (Saccharum spontaneus), Daab (Desmostachya bippinata), Aak (Calotropics procera), Khimp (Leptadenia
In the area, there are several water bodies, temporary ponds, nallas and seasonal rivulet. They support a variety of aquatic flora such as some free floating species like *Lemna minor* and *Pistia stratiotes* found in reservoirs, ponds and puddles. The plants rooted in muddy substratum and with leaves floating above water surface found in the area are *Aponogeton nutans* and *Kamalgatta* (*Nelumbo nucifera*). Some anchored and submerged species having contact with water and are rooted in the muddy soils at the bottom of the water bodies are *Hydrilla verticillata*, *Potamogeton crispus*, *P. nodosus* and *Vallisneria spiralis*. On the banks of ponds and streams emergent anchored species grow luxuriantly during the rainy season and winters. Common examples of such species are: *Cyperus alutus*, *C. cuspidatus*, *C. digetatus*, *C. flavidus*, *C. squarosus*, *Echinochloa crus-galli*, *E. stagnina*, *Eleusine indica*, *Fimbristylis dichotoma*, *F. ferruginea*, *F. squarrosa*, *Hoppea dichotoma*, *Scirpus roylai*, *Typha angustata* and species of *Paspaliduim* and *Paspalum*. Wetland or marshy plants form rich vegetation when water recedes and the land becomes exposed. Common plants observed during present study were: *Aeschynomene indica*, *Alternanthera sessilis*, *Ammania baccifera*, *Dentela repens*, *Eclipta prostrata*, *Polygonum glabrum*, *P. plebieum*, *Potentilla supina* and species of *Cynotis*, *Cyperus*, *Hygrophila*, *Lindernia*, *Lipocarpha* and *Paspaliduim*. Plants like *Ageratum conyzoides*, *Atriplex crassifolia*, *Bacopa monnieri*, *Bergia ammanniodes*, *Boerhavia chinensis*, *Chrozophora rotterleri*, *Caldenia procumbens*, *Commicarpus verticillatus*, *Corchorus depressus*, *Glinus lotoides*, *Phyla nodiflora*, *Rumex dentatus*, *Trigonella occulta* and tree species *Phoenix sylvestris* (*Jangli Khajoor*) which generally come up after drying of the water in the ponds (see Annexure VII B).

Bulbull (Red Whiskered), Cuckoo (Pied Crested), Dove (Red Turtle), Hoopone, Lawing (three species: grey headed, Redwattled and Spurwinged), Myna (three species: Brahminy, Common and Pied), Owl (Great Horned), Spurfowl (Painted and Red), Tree Pie (Indian), Woodpecker (Yellow fronted pied), House sparrow, Crow, Peacock etc. Three species of Vulture Black or King, Indian Longbilled and Indian Whitebacked were seen few years back but now completely disappeared from the area. There are several species of insects including butterflies, spiders and a few species of amphibians found in the area. In water bodies, a number of species of Molluscs and fish are found (Sharma, Dr. Satish Kumar, a personnel communication, April 23, 2001) (see details in Annexure VII A).

2.4.2. Agriculture Eco-system

Arvari catchment is characterised by the occurrence of erratic rainfall. Two crop patterns exist in most part of the area. The Kharif crop is grown during monsoon season under rain fed conditions. The major crops of the area Bajra, Maize, Jawar, Groundnut (Moongphali), Sesame (Til), Kali Jiri, 2-3 pulses mainly Mung etc. Improved varieties/hybrid seeds of bajra are grown by most farmers. In Rabi crop, wheat, mustard and gram (Channa) cultivation is a common practice in irrigated lands throughout the area but Tara-mira (Eruca sativa), barley and gram are also frequently grown in rain fed areas. Several varieties of improved seeds of wheat crop are also grown.

Other vegetable yielding plants like Bhindi (Abelmoschus esculentus), Gajar (Daucus carota), Muli (Raphanus sativus), Bengan (Solanum melongena), Bandgobi (Brassica oleracea var. capitata), Phoolgobi (Brassica oleracea var. botrytis), Kaddu (Cucurbita maxima), Kakree (Cucumis sativus), Sakarkanda (Ipomoea batatas), Tarbooj (Citrullus lanatus) etc. are extensively cultivated in places where the irrigation facilities are available. These vegetables are grown in nearby water ponds and in banks of rivulet Arvari. Most of the farmers who have
irrigation facilities have switched over from traditional method of subsistence farming to commercial farming. However, there is a general increase in the use of chemical fertilizers, adoption of high yielding varieties of crop seeds, use of chemical insecticides / pesticides / fungicides. The use of mechanical farming techniques is increasing like most farmers use tractors for ploughing lands and use thresher machines for separating crop seeds from husk. (information collected during present study)

2.4.3. Waterbodies

There are about 250 water harvesting structures (Johad) and anicuts build along the catchment of the rivulet Arvari.

Over a period of 15 years, these structures have replenished ground water and increased the water table enabling the river to flow perennially again. For regulating resource use in the Arvari catchment, a people's parliament (Arvari Sansad) was formed for taking collective decisions.
An important water reservoir in the area is *Saithal Sagar*. This water body has rich aquatic flora and fauna. Seen details on page 13 in box 2.
### Box 3

**Johad** provides water to the local village communities for irrigation, drinking and for other domestic purposes. It increases bio-mass productivity / fodder availability and gives women more time for child-care, encourages micro entrepreneurships i.e. surplus food grain, milk and milk products, better impact on health and hygiene due to increased water availability.

*Johad* are much more than mere water harvesting structures for the community to which they belong. These are an integral part of the socio-cultural milieu. Most ceremonies do take *Johad* into account as if these mute structures are part of a large family.

### 2.5. Brief History

During 1980s, the area of *Alwar* district had somewhat desertified landscape. Agricultural productivity was low causing high out-migration. Pastoral activity was not enough to prevent this migration. The outside hills of the *Sariska Reserve* were largely devoid of forest cover and severe soil erosion created agricultural problems and degradation of natural vegetation (TBS 1995). Further, the Central Ground Water Board determined that extraction of ground water in the area was greater than the recharge potential and the area was thus classified a “dark zone”. Rainfall was rapidly lost as runoff and surface water availability (in both wells and streams) was limited to the months of monsoon (*Bansuri Taneja 2000*). This situation is somewhat contrary to the picture that emerges from colonial records. Agriculture appears to have been yielding high returns as revenues (from both cultivation and livestock rearing) were recorded as high and regular in the area at the turn of the century (*O’Dwyer 1901*). There appears to have been some potential for even expanding agriculture in *Thanagazi* at that time, though 62% of the land listed as ‘uncultivable’ because of topographical constraints. There is thus no indication of water scarcity. About 12% of *Alwar*’s land area was covered with forest. Total forest products yielded a sizeable income for the state, with bamboo listed as a particularly important product for the state. In addition to forests, numerous grasslands and woodlands were under state ownership and control, though these were often opened up for village use after the state’s needs had been met (*Imperial Gazetteer 1908*).
Rainfall was averaged at 60 – 65 cm p.a. during the late 19\textsuperscript{th} and early 20\textsuperscript{th} centuries, similar to the rainfall averages at present. As far as surface water resources are concerned, the Ruparel was perennial and the Ajabgarh and Pratapgarh (or Arvari) streams are variously recorded as having flowed all year round in years of good rainfall (\textit{Imperial Gazetteer 1908}), or as perennial streams. Sugarcane, a water intensive crop was also cultivated in Thanagazi during 19\textsuperscript{th} century, though this practice had ceased by the time of the first revenue assessment carried out by colonial authorities (\textit{O'Dwyer 1901}).

Well irrigation is recorded to be of great importance in Thanagazi. Ninety eight percent of wells are recorded as holding fresh water, the period of availability of this well water (i.e. in terms of year round water supplies) being dependent on rainfall held by small dams and embankments on field boundaries. The existence of retention structures is further implied by the categorisation of certain cultivated lands as \textit{dhari-land}, occassionally inundated from hill torrents or from releases from irrigation dams. By the end of the 19\textsuperscript{th} century, however the system of small dams and embankments on field boundaries was clearly heightened impact of drought in Thanagazi during 1898-99 (\textit{O'Dwyer 1901}).

The disintegration of the water harvesting system becomes significant in view of the central role; its re-establishment has played important role in environmental recovery in the \textit{Arvari basin}. TBS activists and community workers feel that the decline in agricultural conditions was rooted in the state of decay of water harvesting structures. They hold that the loss of local control over natural resources was responsible for this. Similarly, forest cover and quality are believed to have declined as the state established control over forests and communities no longer felt a sense of ownership nor a responsibility towards safeguarding these resources. Non-local agents of deforestation and mining operations, which enjoyed protection from the state, caused degradation in their own height and further alienated the local populace from their resource base (\textit{Bansuri Taneja 2000}).

Story of Arvari’s revival is the story of the 72 villages in its 503 sq. km watershed: Trailing the 45 km river is a journey back in time. As the river slices through lush green fields, the villagers constantly recall its past: “It was dead, like the skeleton of a 100 – year old person. The fields on its banks were barren".
In the 18th century, according to the Alwar State gazetteer, Arvari was known as the Pratapgarh Nala and was considered the main groundwater recharge stream for the villages on its banks. Today, nobody can remember seeing it flow except during the monsoon. But Dead River's course was intact underground, the result of seasonal runoff.

Of the two main sources of the river, one stream originates near Bhaonta – Koylala and other near village Agar. The two streams meet near the Ajabgarh – Pratapgarh road at Palsana–ka–Pahad. From here to its confluence in the reservoir of a dam on the river Sainthal, the river is known as Arvari.

In 1986, when the villagers of Bhaonta – Koylala built a huge johad to catch the gush of water from the surrounding hill-slopes, hardly anybody knew that it was the origin of the river and by conserving rainwater; they were injecting life into the river. Since 1986, about 250 water-harvesting structures have come up in 72 villages in Arvari's watershed. After seeing the benefits of the dam in Bhaonta, TBS contributed 50 percent to build a johad of village Kaled at the source of the river, which in 1987 itself got filled up with water. This johad, like the one in Bhaonta – Koylala recharged the natural drainage of the river at source (see details at page 61). TBS people never realised that they were recharging a river. Their effort was just to catch and allow water to percolate.

Beginning with Jogiwala johad on a monsoon stream flowing into Arvari in the valley, many smaller Johad were constructed by villagers. These structures were collectively recharging ground water, as was noticeable in the water table of the wells. Some 72 villages were harvesting water and checking run-off in the catchment area along the river's course.

The economic and ecological miracle of regeneration in Alwar district is being brought about by using three percent of the rainfall. This small percentage is being used for irrigation and has made a tremendous change. The region is today thriving and prosperous. In 1990, it flowed till October. In 1991 till January next year; In 1992 till February next year; In 1993 till March next year and in 1994 it flowed till April next year. So, it can be said that the river Arvari came to life and started to flow again for the full year in 1994 and it has been perennial since then. The river Arvari came to life through village community efforts. Since then, the aquatic life began to thrive itself in the river. Now, the government of Rajasthan is
claiming control over the river. Obviously, the community people of the area do not agree with the Government’s claim because they gave life to the river. Here the question of ownership and justice arose. The Fisheries department of the Government of Rajasthan gave a contract for fishing in the Arvari River in November 1996. The residents of Hamirpur village did not allow the contractor for fishing in their river. The government administration threatened the villagers for this act. The Department of Fishery issued a notice to the concerned NGO – Tarun Bharat Sangh on 02 December 1996 and made following observations.

- The rivers belong to the Government of Rajasthan.
- TBS is a party to the present agitation.
- The Fishery Department was giving fishing rights to the fishermen for the past several years.
- If TBS continues to support the river Arvari’s present agitation, then it would have to face dire consequences.

On December 15, 1996, TBS responded to the notice and raised the following points:

- The Arvari’s ‘People Movement’ is right but TBS is not a party to it.
- The Fishery Department should produce the earlier contract papers to TBS so that it could see the terms and conditions therein.
The Fisheries Department did not furnish the earlier contracts perhaps it had none. Its contention that it had been issuing fishing rights for years was not correct. TBS organised a meeting between the village people and Government Officers at Hamirpur on December 25, 1996. People conveyed the message to the Government officials that they will not allow fishing in their waters. On January 27, 1997, again the fisheries department informed the community that the legal steps would be taken against any persons who obstruct the contractor from fishing. People organised themselves, and again a meeting was held on January 28, 1997. It was resolved to fight the decision of the Government. The struggle, which was based on Satyagrah, finally brought results. The Government withdrew the claim and cancelled the contract for fishing (Patel, 1997).

The Government policies and efforts for conservation, which have given the state full control over forests and wildlife, have caused considerable conflict between people (especially forest dwellers) and the official machinery. For legal implications of community-based conservation (see box 6 on page 58-59).

Another reason of conflict is the decreasing number of tigers in the forests due to poaching by outsiders and loss of habitat, resulting in an increase in number of prey species like the Blue bull (*Neelgai*), deer and wild boar. Large herds of these herbivores damage agricultural crops of farmers around Sariska.

At a meeting held at Hamirpur village in 1998, a collective decision was taken by villagers of the Arvari catchment to form a Sansad (parliament) that could help regulate resource use in the Arvari catchment (See details in chapter 6).
CHAPTER 3

CURRENT (KNOWN) RANGE AND BIODIVERSITY

3.1 State of Natural Ecosystems and Biodiversity

Biological diversity of Alwar is one of the most significant in the entire Rajasthan and even in India. Several thousand wild species of naturally occurring plant and wild species of fauna are found in this area. This is when a number of biologically rich areas of the district such as Sariska have not yet been completely surveyed and explored. This diversity is not only significant but is unique too. Many species of plants, which are endemic to Rajasthan, are found in the area (e.g. Commiphora wightii). A great range of medicinal plants and shrubs are found in the district. In the case of fauna also, endemism is high among groups like reptile and birds as well as invertebrates and insects.

Forests are distributed all over the Aravalli hill ranges of the district. The composition and density of the species vary from place to place. The total geographical area of the Alwar is 8330 sq km, 328 sq. km. (4%) of which is covered by dense forests and 806 sq. km. (10%) by open and degraded forests. In plain areas 476 sq. km. (6%) is covered by thorny scrub forest.

The present situation of natural ecosystem and its biodiversity in the district is extremely poor and so disrupted that it is difficult to even assess it properly. This destruction of biodiversity is being caused by many factors and reasons; but policies and laws introduced and enforced by government play a significant role in this regard. Droughts and desertification also affect and degrade biological biodiversity. The destruction of biodiversity is in turn producing adverse effects on the climate and human welfare. Currently at least 3 percent of the recorded floral and faunal elements are on the threatened list. Many of them are on the verge of extinction. For example, among plants species, Guggal (Commiphora wightii) and Phog (Calligonum polygonoides) are on the verge of extinction. Similarly, many species of mammals such as Tiger, Leopard and Four-horned antelope (Tetracerus quadricornis) are threatened species. This should not surprise one, for in the last few decades, this region has lost about 70% of its forests. This
happened due to abandoning of traditional conservation and management practices for natural resources and biodiversity. Habitat and ecological destruction through encroachment, hunting, wood stealing, over exploitation, poisoning by pesticides / insecticides and chemical fertilizers, displacement of indigenous species by exotics, mining and quarrying have all contributed to this colossal destruction. Almost all government policies, rules, regulations and schemes end up working in a negative direction, especially at grass root levels. Today, even in traditional system of natural resources conservation and management stand seriously deteriorated. The new value system and enforced state control over land have placed communities aside and away from the management and conservation of flora and fauna.

Since, there is no adequate past record of wild biodiversity for Arvari basin as well as Alwar, no one can say for sure as to how many species have already been lost. The process continues for a number of species and sub-species as habitats, which have scarcely been explored, continue to be destroyed (Patel, 1997).

In a preliminary survey of the ten villages of Arvari catchment that was conducted in December 2000, botanists, zoologists and local community persons were involved. The survey team (Annexure I) prepared an inventory of the natural flora and fauna of the Arvari region from both primary and secondary data sources. The floristic and faunal elements were analysed by the researchers (experts of flora and wildlife). Some plant samples were also collected from field and they were correctly identified by matching them with herbarium specimens in the Botany department, University of Rajasthan, Jaipur. The status of the floral and elements has been given in the tables 1 and 2.

Table 1. Status of Biodiversity-Flora

(A = Abundant; C = Common; F = Frequent; R = Rare; V.R = Very Rare; Th. = Threatened / at the verge of extinction)

<table>
<thead>
<tr>
<th>Life-Forms</th>
<th>No. of species</th>
<th>Occurrence (No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>1. Trees</td>
<td>71</td>
<td>07</td>
</tr>
<tr>
<td>2. Shrubs</td>
<td>59</td>
<td>11</td>
</tr>
</tbody>
</table>
In the area, there are 435 flowering plants species, out of which 10 species are considered as threatened and 24 species are found very rarely. In the area, the lower groups are non-flowering plants like ferns, bryophytes and fungi are poorly represented (see detailed list in Annexure Vlb).

There is rich diversity in animal world of the area, but 36 species of the animals are found very rare (see details in Annexure Vla). For last 10-15 years, village communities of some of the village have been making effort to regenerate
the forest resources in their areas. The successful community efforts have regenerated forest resources and revived wild life in Bhaonta-Koylala and Chaunshla-Padak Chhapali villages. In other areas poor conditions of the natural forest is subjected to heavy pressure of grazing livestock.

Some patches in the hilly tract of the Arvari region are of semi-savannah growth. Locally they are called “Birs”. Some areas are dedicated to local deity called sacred groves. The tree/shrub growth species found in these areas include Anogeissus pendula, Prosopis cineraria, Acacia leuceophloea, Prosopis chilensis (commonly known as Juliflora), Acacia senegal, Salvadoria persica along with Balanites aegyptiaca and Ziziphus nummularia. The scrub growth consists of Calotropis procera, Mimosa hamata, Cassia auriculata etc. and the climbers found are: Asparagus racemosus, Cuscuta reflexa, Abrus precatorius, Atlasia searataeoids, Blastenia fimbristipula, B. garchini, Cardiospermum halicacabum, Clitoria ternatea, Cocculus hirsutus, C. pendulus, Corallocarpus epigaeus, Cayratia trifolia, Ceropegia bulbosa, Cissaméllos pareira, Citrullus colocynthis, species of Cucumis, Merrema aegyptia, Momordica balsamina, M. charantia, Mucuna pruriens, Mukia maderaspatensis, Oxystema esculentum, Pyrostegia venusta, Rivea hypocrotateriformis etc. The grasses found are Cenchrus ciliaris, Sorghum halepense, Apluda mutica, Desmostachya bipinnata, Saccharum bengalense, S. spontaneum, Dactyloctenium scindicum and species of Aristida and Eragrostis. (Based on field observations of Dr. O P Kulhari, Dr. R K Srivastava and Dr. S K Sharma, all taxonomists and Dr. Sharma as wildlife expert during field surveys).

Some sacred groves are having rich biodiversity and local people take care to protect plant species. The productive potential of these areas is very good and their proper management can further improve the productive status of these areas by local communities in confidence and ensuring their active participation.

3.2. State of Agricultural Ecosystem and Domesticated Plant / Animal species and Varieties

One of the important components of the biodiversity is the diversity in the crop species and varieties. The principle crops of the Arvari region are Pearl millet (Bajra), Sorghum (Jowar), Maize, Sesame, Pigeon pea and Kali jiri (only in Thanagazi block) in Kharif crops and Wheat, Mustard and Gram in Rabi crops.
Local farmers created and perpetuated gene pools by natural selection. The “Jhakharna” variety of Bajra is being perpetuated through natural selection in the region.

Information about the traditional varieties and new varieties introduced is given in table 3.

**Table 3. Information regarding biodiversity of crops**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Crop</th>
<th>Traditional variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bajra</td>
<td>Jakharana</td>
</tr>
<tr>
<td>2.</td>
<td>Maize</td>
<td>Dholi, Sathi pilli, Pilli</td>
</tr>
<tr>
<td>3.</td>
<td>Jawar</td>
<td>Safed Lal</td>
</tr>
<tr>
<td>4.</td>
<td>Jou</td>
<td>Modia</td>
</tr>
<tr>
<td>5.</td>
<td>Sarso (Mustard)</td>
<td>Laturia, Lotani</td>
</tr>
<tr>
<td>6.</td>
<td>Wheat</td>
<td>Arjun, Farmi</td>
</tr>
<tr>
<td>7.</td>
<td>Chickpea / Gram</td>
<td>Pila channa, Ujjain 21, Dohad yellow</td>
</tr>
</tbody>
</table>

(Source: Sahkari Beej Bhandar, Thanagazi)

During village meetings the farmers expressed that although the deshi varieties of wheat cultivated by them earlier needed less amount of irrigation and was good in taste, the chapattis remain soft and believe it to be more nutritive and there was no requirement of artificial chemical fertilizers; only some farmyard manure was good enough. Deshi varieties of wheat are still grown in areas where adequate irrigation facilities are not available. Some farmers also mentioned that they grow deshi variety for their family consumption. Yet it had some inherent drawbacks, which are as follows:

- The yield was less.
- The plants were tall and in the month of March with strong winds in the area, they were susceptible to lodging.

Similarly, the local variety of Bajra is considered to be good because of its good taste and is very suitable for making Khichri. This is a preferred dish in the area especially during winters. The local variety also gives good fodder and its water requirement is also less in comparison to the new variety. However, the yield of the new variety is 2-3 times more than the local variety. Most cultivators prefer to grow the local / deshi varieties of Jawar, Maize and Barley because of the shortage of water for irrigation and secondly for their good taste and palatable fodder.
Improved varieties of mustard are generally cultivated. New variety, with the available amount of irrigation gives good harvest. Other advantage of the improved variety is that the seed does not fall. Early and late, both varieties give good harvest. This crop is more remunerative and less expensive.

The farmers also expressed that the use of the tractors instead of bullocks for ploughing the land, the soil results in superficial working of soil. The substratum of soil remains hard and is probably responsible for some of the soil borne diseases. The use of the tractor also uprooted a significant number of perennial plant species like *Desmostachya bipinnata*, *Saccharum spontaneum* that are completely disappearing from the area. The use of the pesticides / insecticides and chemical fertilizers is increasing which is causing adverse effect on soil micro flora and fauna. This is resulting into degradation of the natural fertility of the land.

### 3.2.1. Improved crop varieties

New improved and high yielding varieties of the crop plants have been vastly introducing in the region for the last few decades.

Introduction of these varieties have substantially increased the productivity of the crops in terms of grain / seed production but quality of fodder has not increased substantially or rather has decreased with the increased demand of water for the irrigation and chemical fertilizers for maintaining the fertility of the soil, needing new seeds every year from the market has made the farmers dependent on outside agencies.
Table 4. Improved varieties of Common Crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Improved varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>RR-21, Kalyan Sona, Raj-1482, Lok-1, WH-147.</td>
</tr>
<tr>
<td>Chickpea</td>
<td>RSG-44, GNG-147, GNG-663, G-130.</td>
</tr>
<tr>
<td>Maize</td>
<td>Ageti-76, Ganga-2.</td>
</tr>
<tr>
<td>Groundnut</td>
<td>RG-141, MA-10, M-13, RGB-87.</td>
</tr>
<tr>
<td>Sesame</td>
<td>RT-46, RT-54, RT-125.</td>
</tr>
<tr>
<td>Mungbean</td>
<td>RMG-62, RMG-268.</td>
</tr>
<tr>
<td>Cowpea</td>
<td>RC-19, FS-68, C-152.</td>
</tr>
</tbody>
</table>

(Source: Sahkari Beej Bhandar, Thanagazi & Agricultural Research Station, Durgapura, Dr. D K Saxena & Dr. S M Bhatnagar)

Table 5. A comparison of the mean crop productivity over sets of five years

<table>
<thead>
<tr>
<th>Crop</th>
<th>Crop productivity (Kaha)</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearl millet (Bajra)</td>
<td>298</td>
<td>380</td>
</tr>
<tr>
<td>Mustard</td>
<td>784</td>
<td>957</td>
</tr>
<tr>
<td>Wheat</td>
<td>1820</td>
<td>2567</td>
</tr>
<tr>
<td>Kharif pulses</td>
<td>147</td>
<td>201</td>
</tr>
<tr>
<td>Barley</td>
<td>1506</td>
<td>1996</td>
</tr>
<tr>
<td>Sesame</td>
<td>102</td>
<td>115</td>
</tr>
</tbody>
</table>

(Source: RAU-ARS, Durgapura, Jaipur)

Figures in table 5 show that there is a significant increase in crop productivity and the highest increase has been observed in wheat productivity i.e. 41 percent followed by Kharif pulses. It is due to the availability of high yielding varieties of these crops.

3.2.2. Vegetables and Fruits

As per the information collected from the 13 villages of the area, 46 types of crops are cultivated in the region and their status is given in the table 6.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Vernacular names</th>
<th>Latin name</th>
<th>Growing status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rayda / Tara-Mira</td>
<td>Eruca sativa</td>
<td>Common</td>
</tr>
<tr>
<td>2.</td>
<td>Jeera</td>
<td>Cuminum cyminum</td>
<td>Rare</td>
</tr>
<tr>
<td>3.</td>
<td>Rai</td>
<td>Brassica nigra</td>
<td>Rare</td>
</tr>
<tr>
<td>4.</td>
<td>Til</td>
<td>Sesamum indicum</td>
<td>Common</td>
</tr>
<tr>
<td>5.</td>
<td>Mung</td>
<td>Vigna aureus</td>
<td>Common</td>
</tr>
<tr>
<td>6.</td>
<td>Chawla</td>
<td>Vigna unguiculata</td>
<td>Rare</td>
</tr>
<tr>
<td>7.</td>
<td>Ganna</td>
<td>Saccharun officinarum</td>
<td>Rare</td>
</tr>
<tr>
<td>8.</td>
<td>Arandi</td>
<td>Ricinus communis</td>
<td>Rare</td>
</tr>
<tr>
<td>9.</td>
<td>Piaj (Onion)</td>
<td>Allium cepa</td>
<td>Common</td>
</tr>
<tr>
<td>10.</td>
<td>Lahsun (Garlic)</td>
<td>Allium sativa</td>
<td>Rare</td>
</tr>
<tr>
<td>11.</td>
<td>Gehun (Wheat)</td>
<td>Triticum aestivum</td>
<td>Abundant</td>
</tr>
<tr>
<td>12.</td>
<td>Makki (Maize)</td>
<td>Zea mays</td>
<td>Common</td>
</tr>
<tr>
<td>13.</td>
<td>Bajra (Pearl millet)</td>
<td>Pennisetum typhoides</td>
<td>Abundant</td>
</tr>
<tr>
<td>14.</td>
<td>Jou (Barley)</td>
<td>Hordeum vulgare</td>
<td>Common</td>
</tr>
<tr>
<td>15.</td>
<td>Chana (Gram)</td>
<td>Cicer arietinum</td>
<td>Abundant</td>
</tr>
<tr>
<td>16.</td>
<td>Dhaniya (Coriander)</td>
<td>Coriandrum sativum</td>
<td>Rare</td>
</tr>
<tr>
<td>17.</td>
<td>Mirch</td>
<td>Capsicum annuum</td>
<td>Abundant (Padak–Chhapeli)</td>
</tr>
<tr>
<td>18.</td>
<td>Tamator (Tomato)</td>
<td>Lyeopersicon esculentum</td>
<td>Abundantly grown in Padak-Chhapeli village</td>
</tr>
<tr>
<td>19.</td>
<td>Methi</td>
<td>Trigonella foenum-graecum</td>
<td>Rare</td>
</tr>
<tr>
<td>20.</td>
<td>Somf</td>
<td>Foeniculum vulare</td>
<td>Rare</td>
</tr>
<tr>
<td>21.</td>
<td>Ajwain</td>
<td>Trachyspernum ammi</td>
<td>Rare</td>
</tr>
<tr>
<td>22.</td>
<td>Bengan (Brinjal)</td>
<td>Solanum melongena</td>
<td>Common</td>
</tr>
<tr>
<td>23.</td>
<td>Palak</td>
<td>Spinacia oleracea</td>
<td>Common</td>
</tr>
<tr>
<td>24.</td>
<td>Shakarkand (Sweet potato)</td>
<td>Ipomoea batatas</td>
<td>Rare</td>
</tr>
<tr>
<td>25.</td>
<td>Rijka</td>
<td>Medicago sativa</td>
<td>Common</td>
</tr>
<tr>
<td>26.</td>
<td>Mooli (Radish)</td>
<td>Raphanus sativus</td>
<td>Common</td>
</tr>
<tr>
<td>27.</td>
<td>Phoolgobhi (Cauliflower)</td>
<td>Brassica oleracea subsp. botrytis</td>
<td>Common (Jhiri)</td>
</tr>
<tr>
<td>28.</td>
<td>Bandgobhi (Cabbage)</td>
<td>Brassica oleracea spsp. Oleracea</td>
<td>Rare</td>
</tr>
</tbody>
</table>
Some cultivated fruits and a number of wild fruits having good nutritive food and economic value grow in the region. Some of the important indigenous varieties of fruits of the area are as follows:

- **Mango**: (*Mangifera indica*) is cultivated in moist hilly parts and near water reservoirs like *Sainthal Sagar* in the region.

- **Jamun**: A variety of *Jamun Syzygium cumini* is cultivated rarely in parks and gardens. Its fruit is much valued for its taste and medicinal use.

- **Khajur** (*Phoenix sylvestris*) grows naturally on the banks of rivulet *Arvari* and in nallas and other moist places. Children and farmers like its fruits while they are working in their agricultural fields. The tree is a roosting site for the weaverbirds.
• **Sitaphal** (Custard apple – *Annona squamosa*) rarely occurs in natural forests of *Bhaonta-Koylala*. It is cultivated in gardens and kitchen gardens. The pulp of the fruit is sweet and nutritive.

• **Jangli Ber** (*Ziziphus nummularia*) grows gregariously in fallow and wasteland and forest areas. Cattle grazers collect the ripened fruits of this plant during the months of October and November and these have a high nutritive value. This species is fast declining due to increasing mechanised farming and growing of monoculture crops.

• **Ber** (*Ziziphus mauritiana*), a few varieties of this plant are cultivated for edible fruit.

• **Aonwla** (*Emblica officinalis*) is rarely found in natural condition but farmers of the area in recent years have started to grow its improved varieties on farmlands. The fruit is used in Ayurvedic medicines.

• **Kair** (*Capparis decidua*) plant is widely distributed throughout the area and un-ripened and young fruits of this species are used as vegetable and for preparing pickles. The dry fruits are preserved and used as a vegetable to be cooked later. The food and medicinal values of this fruit are high. The studies have shown that this fruit is rich in crude protein, fibre, iron, zinc, manganese and copper. These properties remain unaffected during processing of the fruit. No scientific study for the improvement of the fruit, its propagation, harvesting and processing has been undertaken which needs attention of the scientists. The Kair shrub is an important site for local and migratory birds. Wild ungulates and birds eat the fruit. In highly degraded areas, it provides shelter to small mammals from the scorching summer sun. This species normally grows on common village pasturelands, groves and farmlands. It is being over exploited for fuel wood and picking unripened fruits from the tree. It is fast disappearing from many areas due to the above reason.

Other important fruits occurring naturally in reserve, protected forests, or cultivated on agriculture lands or in kitchen gardens are:

• **Amrood** (*Psidium guajava*) is commonly grown in kitchen gardens and farm houses.
• **Gonda** (*Cordia gharaf*) grows naturally in dense forest.

• **Emli** / Tamarind (*Tamarindus indica*) occurs naturally in fallow and forestland and planted in parks, gardens and road sides.

• **Piloo** (*Salvadora persica*) grows naturally in sacred grows; fallow lands, village common lands and field boundaries and gives shelter to wildlife.

• **Gangeran** (*Grewia tenax*) is found in natural state in dense forests.

• **Bel** (*Aegle marmelos*) grows naturally in forests and planted in the backyards of houses, parks and gardens.

• **Sangri** (*Prosopis cineraria*) is a common tree of the plain areas growing in agriculture fields. It increases the natural fertility of the soil.

• **Dansar** (*Rhus mysurensis*) grows gregariously at hill slopes and hilltop in the forest areas.

• **Banana** (*Musa paradisiaca*) is planted rarely in the backyards of the houses.

• **Kakar** (*Flacourtia indica*) grows in natural conditions in the protected forest of Bhaonta-Koylala and Chausala–Padak Chhapali.

• **Papaya** (*Carica papaya*) is grown rarely in the kitchen gardens only.

• **Falsa** (*Grewia asiatica*) rarely occurs in natural condition in the protected forests of Bhaonta-Koylala.

• **Bad** (*Ficus benghalensis*) grows in rock crevices and planted on community land near human habitation for shade.

• **Gular** (*Ficus glomerata*) grows naturally in the valleys of Aravalli hills.

• **Nimbu** (*Citrus lemon*) is planted in kitchen gardens and on farmlands only.

### 3.2.3. Domesticated Animals

Domestic animals make a major contribution to the economy of the people of **Arvari** basin. Animal husbandry is one of the main occupations, goats are reared by all castes / communities in rural areas but mainly Gurjar and Meena communities of the area rear buffaloes and cows for milk and sheep for wool
production. These animals also provide valuable manure for the agricultural fields. Some poor people also rear pigs for meat and hen / cocks for eggs and meat. Some of the indigenous breeds of animals found in the Arvari basin are much prized for their sturdiness, heat tolerance, disease resistance and for thriving in adverse habitat conditions. The important breeds of the region are:

**Cow:** Important breeds of the cows found in the area are *Haryana* and *Mewati*. *Haryana* breed possesses good milk strain and the males make good drought cattle. The raised head makes it look stubborn and majestic. The face is long and pointed and the forehead is flat. A perceptibly raised bone, in the middle of forehead is the characteristic sign of the breed. Nostrils are broad and black. Eyes are big and shining. Ears are comparatively small and have a slight drop. Horns are 12 to 20 cm long and shapely. They are almost straight when small but slope inwards when grown in size (BSAP *Aravali eco region*, 2002).

*Mewati* breed is valued as dual-purpose animal and for heavy plough and carting. They are mostly white in colour with a dark head. The cows give fairly good quantity of milk. They have long pointed face and raised forehead. The horns growing from the outer corners of the head with their points turned back is the principal identification mark of the breed.

**Buffalos:** Breeds of the buffalos found in the area are *Murrah* and *Surti*. *Murrah* breed is considered to be the best milk yielding variety of India. The animals of this breed have characteristically curled horns and have massive and stocky built with deep frame and short massive limbs. The average milk yield is about 11 kg per diem, which sometimes goes up to 14 kg. The fat content is high (about 7%). The male animal is placid, docile and slow worker but is powerful for heavy cartloads.

*Surti* buffalos are of medium size and the milk yield of these animals is not high.

**Goats:** Goats are reared for milk, meat and hides. Some goat breeds give high yield of milk. These animals, because of their ability to survive on meagre quantities of fodder, are reared all over the area. The animals graze in the forest areas. The most important breed of the goat in the area is *Jakharana*. This breed is found in *Jakharana* village in *Alwar* district. The breed is named after the village where it is found. The milk yield of this goat is very high and goes up to 8 kg milk
The goat is black in colour with white spots around its eyes, face and ears. The milk yield of this breed decreases as one moves away from this village.

**Sheep:** Sheep rearing is an important occupation of the cultivators in single crop areas since they are engaged in agricultural occupation for only about four months in a year. Sheep and wool thus contributes substantially to the economy. The important breeds found in the Arvari basin are Chokla, Nali and Malpura.

*Chokla* breed is light or medium in weight. Dark brown or black patches that are considered as distinctive breed characteristics mark brown face. The tails and ears are of medium length. It produces good quality carpet wool. The ewes weigh between 30-40 kg.

*Nali* sheep is a brown-faced animal with medium to long leafy ears. It has a big sized body with good depth, short legs and yellow hooves. The tail is long and tapering. The body weight of ewes varies from 30 to 35 kg and that of ram between 32 to 40 kg. The wool is very greasy and the quality is medium to coarser. It is stained yellow.

*Malpura* sheep have long well built body with white or light brown face, colour often extending to the neck and the limbs. They have long bare legs, medium to long trails and small ears. The wool produced is very coarse and is suitable for manufacturing of namdas and small carpets.

**Camel:** Camel is used for transport of human beings and material to remote areas and is also used for pulling of specially designed camel carts in rural areas. “Rebaris” bring herds of camel for grazing them in the forest area during the lean period of the year.

**Poultry:** Local non-descript breed of birds, desi-murghi are reared in small numbers for domestic consumption all over the Arvari basin.

**Fisheries:** There are a few fishponds created by the Fisheries Department spread in the Arvari basin. Important among them are Jamwa Ramgarh in Jaipur district and Sainthal Sagar in Dausa district. Under the fisheries development scheme of the Govt., a number of exotic fish have been introduced in these water bodies without proper consideration of the requirement of indigenous fish. This introduction has adversely affected the local species. (Detailed information is not available. There is a need for systematic study).
CHAPTER 4

STATEMENT OF PROBLEMS RELATED TO BIODIVERSITY

4.1. Domesticated Biodiversity

4.1.1. Loss of Traditional Crops: Traditional cropping patterns have changed drastically in the last few decades. The production of the traditional varieties of crops like Bajra, Maize, Jawar, Barley, Wheat, Gram, Pulses have suffered adversely because of:

- Development of irrigation facilities by construction of medium and small-scale projects and tapping of ground water for agricultural purposes increased the area under irrigated crops. The area under traditional crops such as deshi bajra (pearl millet), maize, pulses like mung has reduced and has been taken over by high yielding hybrid varieties of wheat, bajra and pulses which even though require more water.

- In traditional agriculture there was mixed cropping pattern in which both cereals and pulses were grown together. Even there were chances to have some production of one of the crops when monsoon rains were insufficient or any other climatic disaster occurred. But now monoculture pattern of crops sometimes brings zero yields, which causes great loss to the farmers.

- Cultivation now is driven by market and consumer demands, so there is no market available for selling surplus production of pearl millet (Bajra). Therefore, farmers are forced to cultivate more wheat.

- Increasing demand of food grain production and the inability of these crops to cope up with the growing demands. This resulted into introduction of high yielding / hybrid varieties. The public distribution system helped in changing the food habits of the people by providing wheat at cheap rates.

- The government policies of promoting the high yielding varieties by providing seeds, fertilizers and pesticides / insecticides at subsidized rates.

- Even in ‘Food for work programme’ executed by the government, wheat is distributed in place of wages in Maize and Bajra eating people. This resulted into changing food habit of the people.
• Easy availability of wheat at cheaper rates reduced the consumption of coarse grains such as Bajra, Jowar, and Maize etc.

• Contract (Thekka) for cultivation of Kamalgatta (Nelumbo nucifera) in Mathawali Nadi near Sainthal Sagar has been given to outside people by Govt. deptt. for last 5-6 years. Local people even do not use Kamalgatta (rhizome) as vegetable and are not aware of its use. They say that this plant is causing water pollution. Further, local community is not involved in the contract giving process and the revenue collected from this is not used for the local resource development.

• Crops like pulses and Gawar (Cyamopsis tetragonoloba) are more susceptible to damage by blue-bull (Nilgai). The farmers avoid growing these crops in the area because the population of Nilgai is significantly high.

• Debris from blasting and drilling in marble mines of Jhiri and Kalsi Kala villages has coated crops and smothered forests.

• Mines operating 100 ft underground have also disrupted water table on which local wells and irrigation rely.

4.1.2. Domesticated Animals

Some significant reasons for the loss of domesticated animals are:

• Fast growing population of the area is bringing more and more land under cultivation, mining, industries and human habitation / urbanisation. As a result of this, the forest grassland areas are decreasing at a fast pace. This is causing reduction in the population of the cattle mainly cows, goats and sheep.

• Mechanization of agriculture has reduced dependence on bullocks and camels for ploughing of fields and transportation of the agriculture produce and other things. Therefore, these animals are being neglected.

• Development of infrastructure, particularly construction of roads and rural electrification is reducing the role of animals.

4.2. Wild Biodiversity

4.2.1. Forests

During the field survey, focussed group discussions with community members, women’s groups were held and opinions and perceptions of the
participants were elicited by asking some open-ended or semi-structured questions related to the management of community resources, social issues and status of women, deprived groups and children in the society and conservation of the biodiversity. The efforts were made to know about some common issues related to forest, wildlife and biodiversity conservation between village community and officials of the forest department. The issues and conflicts between forest deptt. and the community people that emerged from the interactions were as follows:

- The rights towards sustenance of the livelihoods of the inhabitants of the forest area have been restricted or almost finished under the Wildlife and Forest Conservation Acts. Therefore, for any activity performed by inhabitants even when meant for their basic need is stopped or banned by any forest personnel. For this sometimes, community resists, sometimes the conflict causes tension between the two groups. Taking *Bhaonta – Koylala* village as a specific example which has been affected by the Wildlife Protection Act and Forest Conservation Act; the villagers have been restricted to sustain their livelihood due to these existing new laws as they were mostly dependent on forest. But now the same community, with their initiative have built *Bhairon Dev* Sanctuary and are protecting / managing / conserving the forest and even fulfilling their basic needs from the forest by adopting community based norms and values.

- Community now, does not have any feeling of ownership and responsibility to protect and conserve the forests because the forest department personnel realise that they are the owners of the forests and bear the sole responsibility for the forest. They many a times treat the inhabitants of the area badly. This indifferent attitude of the forest department foresees the community people to consider forest is no more their thing and they start trying to snatch as much as they could. This makes the conflict situation quite grim. Some of the forest *chowki* (Naka) people several times take bribe (Rs. 100/-) to pass a truck loaded with wood. On the other hand, in recent years, many forest personnel in the area are taking positive initiative to have more community and NGO participation in forest conservation and management, which has helped in reducing the existing conflicts. In coordination with local community and NGO, the forest department has got success in regeneration of forests.
• There were several traditional conservation system and practices in the village community but that were not taken care of while formulating policies and laws related to biodiversity conservation. Even today that are being neglected by government officials these arose conflicting situation several times between forest department and village community.

• In hilly and forest areas, the main livelihood source of the people is animal husbandry and the woods as main source of fuel for cooking their meals. They face acute shortage of fodder and fuel during summers, winters, and are forced to cut green trees in the forest area, which creates conflicting situations between the forest and the village community.

• Over-grazing creates adverse impact on the natural regeneration of the forest vegetation. It also limits fodder availability during drought period.

• Due to diminishing traditional practices such as leaving fallow land, self-maintaining system of the community which used to have checks and balances towards the fodder stock and grazing allowed more than that of the carrying capacity of the land.

• Almost all “birs” (grasslands) and sacred groves in the region are under the control of the State Forest Department. These grasslands, because of neglect and mismanagement are now in a badly degraded stage. The areas are overgrazed and heavily infested with Vilayti babool (*Prosopis chilensis*). Unfortunately, the Forest Department did not realize the importance of these birs in the village economy. In plantations done in this areas could not survive except *Prosopis chilensis*. The thickets of this plant have adversely affected the growth of herbaceous flora. The areas are subject to uncontrolled grazing. Unpalatable weeds are therefore replacing the palatable species of grasses and other plants. The grasslands are loosing their productivity.

• An exotic tree species, Vilayati babool (*Prosopis chilensis* - earlier known as *P. juliflora*) promoted by the Forest Department on a large scale for last several years, now has been spreading at an alarming rate all over the area and causing acute trouble to the village communities. People want to get rid of this plant and appealed to govt. authorities to launch a mass campaign for uprooting the entire population of this tree from the area.

4.2.2. Wild Animals
Main causes of loss of wild animals in the Arvari basin are as follows:

- Increase in human population had increased the demand of agriculture land, which ultimately leads to decreased forest, and pastureland. This affects the natural habitat of wild animals.

- A significant number of biotic elements are getting threatened or are at the verge of extinction due to a large scale quarrying activities, illegal hunting of birds and other wild animals in the area mainly around Jhiri and Sainthal Sagar.

- The population of Vulture, Eagles and Hawks has drastically reduced in the last 5-10 years. Villagers don’t know its reasons, but believe that it is perhaps due to excessive use of chemical fertilizers, pesticides / insecticides in agriculture.

- Illegal hunting of migratory birds in Sainthal Sagar by outsiders is causing heavy loss of biodiversity in the area. Even local community is not making serious efforts for stopping the killing of the birds because the ownership of the Sainthal Sagar is of Government.

- Survival (livelihood) problems have come up in marble mining areas around Jhiri village, especially in Kalsi Kala, badly affecting wildlife, forests, agriculture and ground water resources in the area. The village people suggested that either the entire village be shifted to some other suitable place or quarrying activities be stopped.

- Increasing population of Nilgai / Rojda is causing heavy damage to the crops of the villagers. Therefore, they feel that the govt. should take appropriate measures to control their population or allow their killing on a limited scale.

- There were many religious traditions among community related to biodiversity such as sacred groves (Orans) and Dharadi Pratha. Sacred grove is a piece of forest land dedicated to local deity, in which local community does not allow to cut trees and kill animals. Dharadi Pratha is a traditional system to conserve trees and animal species in which different castes (gotras / clans) and tribes were prohibited from cutting particular trees and killing animal species. In recent years, these traditional practices and local wisdom of the community towards symbolic forest and wildlife conservation has become a forgotten trend among new generation.
• Overgrazing and over exploitation of tree species was observed in the area. The consumption of biotic resources is much more than that of the carrying capacity of the village land.

• Continuous drought conditions for last 3-4 years have reduced the richness of the biodiversity.

• Village community is not able to maintain the old traditional water harvesting structures for example Sainthal Sagar, the entire cess collected goes to government and not utilized for maintaining the resources and no community involvement is taken in the process.

• Hunting of animals by professional communities like Bawarias, Kalbalias, Kanjars, Sansis etc has been observed in the area, which causes loss in the population of wild animals.

4.2.3. Mining

The Hidden Cost - The Effects of mining on people and the environment: Mining is often touted as being an industry that brings with it unlimited benefits for the people in the surrounding areas. Job creation, increased wealth and improved infrastructure are some of the benefits. But what is the real cost to the people and the environment? Mines radically alter the look of an area. Trees are removed, pits are dug, unproductive pits are left untreated, roads are laid and heavy machinery is moved in the area. This instantly creates increased noise and dust pollution along with a rise in the number of motor vehicles in the area. All of this has an adverse effect on the wildlife present in the area particularly on the biodiversity and more vulnerable species. And then the blasting begins creating yet more disruption and destruction. What was once pristine forestland is rapidly turned into a wasteland devoid of wildlife. Added to this is the overburden from the mines that is left in huge piles close to the mines area further blighting the landscape. In Alwar district of Rajasthan state not only the forest area but also Gair Mumkin Rada and all the area of Sariska Tiger Reserve and in Jaipur district Jamuwa Ramgarh Sanctuary is notified in the Wildlife Protection Act 1972 as prohibited area but still mining is being undertaken in this area. Quite apart from the violation of the effected villagers right to livelihood, habitat, environment and wild life animals.
The Government policies regarding sanctioning of mines to the private contractors are seriously neglecting environmental and biodiversity issues. Presently, a large number of marble mines are operationalised in the area and they are causing heavy loss to the biodiversity (both natural and domesticated) and local communities are facing survival problems. The mining operations in the area are not good to the well being of the local communities, biodiversity and survival of natural resources. Especially in villages around Jhiri and Kalsi Kala village, marble mining operation is affecting badly the agriculture and water (even ground water) and the government department is not realising the severity of the problem.

CHAPTER 5

MAJOR ACTORS AND THEIR CURRENT ROLES RELEVANT TO BIODIVERSITY

11. Marble minig at Jhiri village
12. Untreated Marble mine pits causing casualties

Different sections of the society are stakeholders in the natural resource management and conservation of biodiversity. The major actors and their roles are discussed as follows:

5.1. Local Communities

Classification of the major actors has been worked out to know different sections of the community having different utilization patterns, conservation options and priorities about biodiversity. Based on the perceptions of the people, the village population can be classified into ten user groups on the basis of their relationship with the existing biodiversity. The most significant feature of the user
groups is that all user groups are related with agriculture and animal husbandry directly or indirectly as well as cultural, environmental, religious, subsistence and medicinal value of biodiversity (Singh, 1997).

(v) Farmers: About 80 % households of the area are engaged in agriculture and animal husbandry and they have 1.0 – 3.5 hectare land evenly distributed. They use small timbers for their agricultural instruments and roof of their houses. They cultivate maize, bajra, mustard, gram, wheat, tara-mira (rayda) and tobacco. The farmers by adopting community control over cutting of forests create both negative and positive effects on the biodiversity. The positive effect in the sense that they help in protection of forest, organic manure and negative effect in the sense that they are meeting their basic demands for small timbers from the forest by cutting of trees for making their agricultural and household implements. The negative effect was more than the positive on the biodiversity in past but now it is getting reduced.

(ii) Pastorals: This is the second biggest user group of biodiversity. Almost all households of the area have some domestic animals. The main activity of the pastorals group is grazing cattle. The majority of the cattle are of goats and sheep. The excessive grazing in particular parts of the forest creates negative impact on the biodiversity of the region by damaging the natural regeneration of the vegetation. In lean months they cut branches of trees for providing green fodder to their livestock. Positive effect is in the form of seed dispersal and providing manure (dung) by the cattle population. This group has special knowledge about specific use of wild plants species like medicinal value and conservation techniques of the natural resources. Some groups of Shephard from outside the area come in the area for grazing their cattle herds. Sometimes, this creates conflicting situation between local communities and migrants. It has also negative impact on biodiversity.

(iii) Fuel wood collector: The user group mainly comprises of rural women, farmers, pastoralists and pot makers (kumhars). Mainly women collect dry and fallen wood from the forest for their own use for cooking food whereas the pot makers (potters) use firewood and cattle dung to bake their earthen pots. The bulk of the earthen pots known as ‘Aawa’ is burnt in ‘Upla” (prepared from cattle dung) and with dry litter and wood. Mostly, male pot makers perform this activity. The pot making work has commercial value whereas women of the area collect firewood.
for subsistence. Some times, this user groups cut green branches of the trees and after drying these they collect and take them. Therefore, this group produces negative effect upon the tree growth in the area.

(iv) **Fodder (Grass) and Green Manure Collector:** Members of the pastoralists and farmers have perfect knowledge about the nutrient value of the green fodder; yield plants and grasses, their ripening, conservation and propagation techniques. They cut these grasses when they have produced seeds so that next year these grasses grow very well and also store these grasses and foliage part of fodder yielding trees for the lean months. Green leaves and small barks of various plants and trees are also collected and used as green manure in agriculture fields. This biodiversity has natural and subsistence value. All communities mostly avoid the commercial use of these products. The cutting of fodder grasses in forest areas is performed with the permission of the forest department after deposing of certain royalty (tax) with the forest department. Mostly women are invariably involved in cutting and collecting of grass and manure.

(v) **Wild vegetable and Fruit Collector:** This is comparatively a smaller group, which includes landless people, women and children of small farmers and cattle grazers. The members of this group have knowledge about wild vegetables, fruits and other edible parts of plants, their flowering, fruiting, ripening and use periods, nature, taste and nutrient values. They make use of these wild collections in getting vegetables; pickles can be stored for a long period. These products have subsistence, cultural and environmental value.

(vi) **Herbal Healers, traditional village Vaidyas (Gunis) and Dais:** Several people of the area know the traditional medicinal uses of the naturally occurring plants and they use them for treating several common ailments of both human beings and animals. The commercial exploitation of these herbal resources has not been observed in the area. But many outsiders, traditional healers collect some herbs sometime for preparing Ayurvedic medicines. Medicinal, cultural and religious value of these herbs is prominent having no negative effect upon community but positive effect is seen because people who are knowledgeable collect plants, their seeds, roots etc. and regenerate them in the farmlands, parks and kitchen gardens and nearby their hamlets.
(vii) Village priests from the communities and Naths: There are a significant number of temples, and households associated with them whose livelihood mainly depends upon income generated from these temples. They promote several plant species to grow in the premises of the temple. Parts of these plants like leaves, twigs, bark flowers, fruits etc. are used to offer to the deity. Some plants are grown for their aesthetic / ornamental, religious, medicinal and shade purpose. The major village communities associated with the religious places are Brahmins and Naths and more or less they depend somewhat on income from temples, offered by worshippers / visitors and other religious activities. Overall these communities produce positive effect upon biodiversity extending cultural and religious feelings amongst inhabitants.

(viii) Labourers or Seasonal Migrants: Different development and conservation work performed by the Forest Department provide few persons as day labour for local inhabitants mainly males in the area. But a large area is affected by marble mining activities in which a significant population of marginal farmers and landless labourers is engaged in quarrying activities. These labourers exploited plant resources for meeting their needs of fuel wood and fodder. This creates negative impact on the existing biodiversity of the area.

(ix) Gum Collector: This is rather a smaller group of mainly of children (both boys and girls) of cattle grazers and forest dwellers who are engaged in cattle grazing activities. They collect some gum from the forest and farm trees like Dhak (*Butea monosperma*), Khairi (*Acacia Senegal*), Khajri (*Prosopis cineraria*), Deshi babool (*Acacia nilotica*) etc. for their own family’s use and this also fetches some supplementary income to the household. But these children have knowledge about gum producing trees having mainly subsistence value as well as cultural value to a less extent.
Artisans: Artisans of the area comprises different categories of the rural community like carpenter, pot maker, shoe maker, barber, ironsmith, gold and silver smiths, basket makers etc. The population of these categories of artisans is not too high but a significant for biodiversity point of view. People of these categories have the specific knowledge about their activity and use of biodiversity-viz., carpenter about wood/timber for making furniture, barber about leaves for preparing ‘Dona’ and ‘Pattals’, potmaker about fuel wood and cattle dung for baking earthen pots and shoemaker about tannin yielding plants for tanning leather, iron/gold/silver smiths for good heat producing charcoal making woods.

The value of the activities performed by these categories is cultural nuisance and commercial cum subsistence to relative biodiversity and these activities to some extent create negative impact of the plant resources of the area.

Community: Village community being the major actor has undertaken several initiatives that have been discussed in Chapter 6.

The communities living in the villages are aware of the importance of the trees, forest and biodiversity. The indigenous systems of management of forests (especially) villages of Thanagazi block (Alwar) was evolved long before colonial times therefore some traditionally adopted practices are still prevailing.

Box 4.

SACRED GROVES

The traditional practices of forest conservation (sacred groves) in the area are

- **Kakad Bani**: a forest patch on common geographical boundary of two or three villages. This practice is quite common, occurs almost in all sampled villages. The responsibility for protecting this area was shared between these villages. This area was used for controlled grazing and harvesting *minor forest products*, but no felling/lopping of trees was allowed except by a joint decision.

- **Rakhat Bani**: a forest area, which belongs to a single village; the village itself regulated access to an exclusive common resource for the village. This resource was used only during the periods of scarcity, famine and droughts.

- **Dev Bani / Orans** (Sacred groves) were forest patches found almost in all sampled villages dedicated to local deity. The village community religiously...
protected these.

**Dharadi Pratha** was a traditional system for biodiversity (plant and animal species) conservation in which different castes and tribes were prohibited from cutting trees for use as timber and fuel wood, different *Gotra* (clan) protect particular species.

Animals and Plants associated with origin (genesis) of the castes / classes as believed by local communities are not allowed to cut or hunt and the plant species belonging to particular caste or clan is planted nearby their habitation.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Plant / Animal</th>
<th>Caste</th>
<th>Clan (Gotra)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bad (<em>Ficus benghalensis</em>)</td>
<td>Gurjar, Rajput</td>
<td>Chhabadi, Doi, Toongad, Koli, Rajawat, Kushwaha</td>
</tr>
<tr>
<td>2.</td>
<td>Kadamb (<em>Anthosephalus cadanba</em>)</td>
<td>Sharma, Gurjar Yadav, Meena, Saini (Mali)</td>
<td>Panchaala, Poswal, Kasana Jojadiya, Gunwal, Vyadwal, Oochwaas</td>
</tr>
<tr>
<td>3.</td>
<td>Ashok (<em>Polyalthia longifolia</em>)</td>
<td>Meena, Brahmin, Rajput</td>
<td>Tapawas, Jhadoliya, Hada,</td>
</tr>
<tr>
<td>4.</td>
<td>Belpatra (<em>Aegle marmelos</em>)</td>
<td>Gurjar</td>
<td>Dadgas</td>
</tr>
<tr>
<td>5.</td>
<td>Roheda (<em>Tecomella undulata</em>)</td>
<td>Gurjar</td>
<td>Koli</td>
</tr>
<tr>
<td>6.</td>
<td>Neem (<em>Azadirachta indica</em>)</td>
<td>Sharma, Rajput</td>
<td>Upadhyay, Rathore</td>
</tr>
<tr>
<td>7.</td>
<td>Cam (<em>Holoptelea integrifolia</em>)</td>
<td>Meena</td>
<td>Jef, Chidawat</td>
</tr>
<tr>
<td>8.</td>
<td>Peepal (<em>Ficus religiosa</em>)</td>
<td>Rajput, Sharma, Chandela</td>
<td>Chauhan, Balan, Chandel, Bhardwaj, Beriwal</td>
</tr>
<tr>
<td>9.</td>
<td>Babool (<em>Acacia nilotica</em>)</td>
<td>Raigar</td>
<td>--</td>
</tr>
<tr>
<td>10.</td>
<td>Khejri</td>
<td>Sharma, Rajput, Jat</td>
<td>Pankhwadia, Sisodia, Bisnoi</td>
</tr>
<tr>
<td>11.</td>
<td>Chinar</td>
<td>Secular community</td>
<td>Sadhu</td>
</tr>
<tr>
<td>12.</td>
<td>Farah / Faras (<em>Tamarix sp.</em>)</td>
<td>Jat</td>
<td>Johiya</td>
</tr>
<tr>
<td>13.</td>
<td>Mor (Peacock)</td>
<td>Jat</td>
<td>Bisnoi</td>
</tr>
<tr>
<td>14.</td>
<td>Lomadi (Fox)</td>
<td>Mahor</td>
<td>Tapawas</td>
</tr>
<tr>
<td>15.</td>
<td>Honeybee</td>
<td>Gupta (Vaisay)</td>
<td>Khandelwal</td>
</tr>
<tr>
<td>16.</td>
<td>Heeran (Deer)</td>
<td>Bisnoi</td>
<td>--</td>
</tr>
</tbody>
</table>

*(Information provided by local old persons, schoolteachers and persons associated with worshipping place like temple from the villages during fieldsurvey and secondary source: Prof. Mohan Shrotiya (1997), Dharadi- Naye Sandarbh Mein)*.

In many of the villages of the area as observed during the field studies, these traditional practices of forest conservation are still prevalent but now this trend is declining.

5.2. NGO
**Tarun Bharat Sangh** (TBS), a grass root NGO has been working with the village communities for the last 20 years and mobilising people for their own common resource management and building their capacity for the same to make them self reliant so as to achieve the bigger goal of "**Gram Swaraj**". TBS believes that only community can manage, conserve and save wildlife and biodiversity. With this belief TBS initiated different people’s movement; launched “grow tree, save tree”; yatras; beginning from the day of Rakshabandhan by tying thread to the trees; “save water, construct Johad” yatras begin from Dev Uthani Gyarash; “Ganga, Gangotri” yatras for awareness creation towards saving wildlife, forests and rivers and promoting a community based movement towards floral, faunal and water conservation in the region.

- Mobilised people at a common platform and constituted village institution and geo-cultural boundary level institutions like formation of **Arvari Sansad, Gram Sabhas (Lok Samitis)**, Women’s Self Help Groups (SHGs) and creation of village fund for sustenance of the development activity, nature camps for school children and students.
- Disseminating experiences of success stories amongst larger sections of the society all over the country and abroad for the replication of the community based initiatives. In last one year about 70,000 persons visited TBS project area and got exposure of community based approach of bioresources development. (**Source: Annual Report of TBS, 2001-2002**)  
- Organised regular sammelans / workshops / seminars / orientation courses for the people of different sections of the society (including members of PRIs, Women’s groups, NGOs and government officials and grass root workers, development planners, administrators, researchers etc.) and also discussed government policies and regulations regarding water and forest resource management and recommendations were sent to the government for necessary amendments in the existing framework.
- TBS had a long fight against mining since 1987 and organised anti-mining campaigns for stopping quarrying activities in the reserved forest and rich in biodiversity.
• Filed PIL in Supreme Court in May 1991 and also got final verdict in favour of stopping mining activities in and around protected areas.
• Supported people’s non-violent movement (satyagrah) for closing mining (1993) and conducted a long foot march (Padyatra) to save Aravalli (Oct. 1993).
• Organised anti-poaching campaign in nearby reserve forests (Sariska Tiger Reserve and Jamwa Ramgarh Sanctuary) and established a dialogue with people involved in the poaching activities and some poachers were motivated them to become Tiger and Wildlife protectors.

5.3. The Government

The government (both State and Central) is a major stakeholder and actor on the issue of biodiversity. Activities of different departments are directly or indirectly concerned with the issue of the biodiversity of the area.

5.3.1. Forest Department

The department is mainly responsible for managing forest resources and increasing the productivity of the existing degraded forestlands. It has been taking the following steps in this direction:

• Raising of plantations of both local and exotic species for meeting the basic needs of local community mainly for fuel wood.

<table>
<thead>
<tr>
<th>Box 5. Vilayati Babool as a Troublesome Plant for Villagers</th>
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</table>
| Forestland in which forest department has made a plantation of Vilayati babool or locally known as Juliflora (Prosopis chilenensis) on several hectare of forest land in several villages of Jamwa Ramgarh block of Jaipur district. The villagers consider this plantation useless, rather causing troubles for them. Vilayati babool is a medium sized, evergreen tree having fast and dense growth all around in the village and forestland. Before the plantation of Vilayati babool, grass and desi plants were growing which were useful for grazing by village cattle. But this Vilayati babool is unpalatable as cattle do not graze it and does not allow any plant growth under its shade and nearby. It also damages crops. The villagers consider, “this plantation destroys local environment and flora. The forest department plays gamble with the village community in the name of plantation. They should have grown useful plants like grass, creepers, indigenous trees like desi babool, bamboos etc.”.
| This plant is causing serious problems and heavy losses to the village people. There are several examples, which prove its negative impact. Thorns of the plant are long, strong, stiff, and sharp and do not degrade for a long time. When a thorn strikes with the body of human beings and animals by accident, it causes wound and in a short duration this wound becomes severely septic. Several animals die. The affect of its thorn on human |
body is considered more poisonous than the stinging of a scorpion. Impact of these thorns with the tyre tubes of the village tractors causes damage to the tube. This happens frequently and the villagers have to take the tractors 4-5 km to get the tubes repaired which causes both economic and time loss. The villagers are making effort to destroy this plant but they say “if one cuts this tree, it grows four times. Therefore, it should be uprooted or destroyed totally by a machine or by spraying a chemical). The villagers do not know how to eradicate it. Either government or some other agency (NGO) should take responsibility for eradication of this. They are ready to give help in this activity.

- Regenerating the local perennial plant species on degraded lands by making fencings.
- Involving the local village communities through Joint Forest Management.
- Increasing the production and availability of Non-Timber Forest Produce (NTFP) (e.g. fodder grasses for cattle).
- Encouraging farm and agro-forestry by making available suitable plants for the purpose.
- Improvement of tree species by selection of suitable “plus trees” through seed collection and raising seedlings. As the field experience shows that the above steps are not being implemented practically in the sub-state by the department. The plantation of one of the exotic species, *Vilayati babool* (*Prosopis chilensis*) is causing havoc with the local flora as the tree has allelopathic impacts and does not support undergrowth of flora and fauna. The need to shift from exotic monoculture plantations to mixed plantations or regeneration of existing native species has been realized in the past decades. The department is however, not giving due importance to the tree improvement research for genetic improvement of selected species, using biotechnology.
- With the support from TBS, the forest department is involving local communities in the construction of rainwater harvesting structures on the forest land which is promoting to flourish wild animals in the area.

5.3.2. Wildlife division of Forest Department

The department is presently providing protection to the wildlife and restoration of their habitat. The sub-state area is lying in semi-arid region of the state where availability of drinking water for the wild animals was a perpetual
problem in the past. The department did not make much progress in creation of new waterholes and improvement of the existing ones but local villages communities with the support of NGO – Tarun Bharat Sangh created several water harvesting structures, which, partly solved the problem of drinking water for wildlife. It seems sometimes that there are gaps between the understandings of local community, forest and wildlife departments regarding the issues of resource management on forest lands and therefore, local community faces problems for constructing more water holes on the forestlands.

Increasing population of some wild animals species particularly Nilgai is causing heavy damage to the crops of the villagers. Therefore, the people of the area have been demanding from the government for initiating any effective measure to check their population for last few years.

5.3.3. Agriculture Department

The main aim of the government policy is to augment the agricultural production. It has played a rather passive role on the issue of agricultural biodiversity. In fact, the department has indirectly acted against the interest of biodiversity in agriculture. The policy of promoting a few crops by providing subsidised loans to the farmers, a good price on production, mechanization of agriculture, promotion of high yielding varieties and intensive use of chemical fertilizers and pesticides / insecticides are major causes of loss of faunal and micro biodiversity. Although, the department encourages the farmers for balanced use of fertilizers and integrated pest management approach; it is also trying to enforce judicious use of ground water through sprinklers / drip irrigation, but the approach is quite indifferent in the area since most of the farmers are marginal and they have not been trained properly in the new technology use. The department however, does not provide any incentives to the farmers for growing indigenous varieties of crops and land races. Most of the norms do not seem relevant to the present context and need drastic changes to make them relevant to the present day’s ground situation.

5.3.4. Animal Husbandry Department

At present, the emphasis of animal husbandry department is on the improvement of the breed of the cattle. In the past, the policy of the animal husbandry department was to improve the productivity of local/indigenous variety
of cattle by cross-breeding it with high yielding exotic varieties. This policy has failed in the area because of non-availability of nutritive fodder and veterinary care where the crossbreed is reared for dairying. The animal husbandry department is now emphasising on selective breeding of indigenous breeds by artificial insemination. The implementation of this scheme in the Arvari region is very poor and in almost all communities throughout the area, local/indigenous varieties of the cattle are reared on their own.

5.3.5 Fisheries Department

The rivulet Arvari began to flow for the full year in 1994 and new life was given to the river by local communities but the State government claimed right on the river waters. The fishing department of the state government gave contract for fishing in river waters. The village did not allow the fishermen to fish and they agitated against the policy of the state government and fought for their rights continuously for two years. On January 28, 1997, people of Hamirpur and nearby villages assembled and declared “Satyagrah” against the fishing contract given by Rajasthan Government. Finally people won their fight and the government withdrew its decision and cancelled the contract for fishing. People insist on the principle of live and let live in relation to the fish and call it Jeeva Daya i.e. mercy for every living being. But the government policies do not care for people’s aspirations, feelings and community collective decisions. The cess collected from the fishing contracts in Sainthal Sagar is hardly utilized for the maintenance of water reservoir and its development. In its management, the local community is not involved.

The main emphasis of the fishery department is on setting up of hatcheries for increasing the production of fish, mostly the exotic species. The emphasis is also on increasing the fish seed and its production. Near Sainthal Sagar all hatcheries are lying unproductive. There is no programme of increasing the indigenous varieties of the fish.

5.3.6. Horticulture Department

The horticulture department provides information on existing vegetable and fruit species, subsidises to marginal farmers for growing new and improved varieties of fruit yielding plants, and orients the cultivators in using the techniques of growing these varieties. The scientists and concerned horticulture/ agriculture
extension officers of the area visit the farmers’ field and demonstrate the techniques of planting the seedlings and use of pesticides and fertilizers. The department has been promoting especially the new varieties of Aonwala, Ber, Nimbu in the area. This initiative has generated self-employment and increased additional income among small and marginal farmers.
CHAPTER 6

ONGOING BIODIVERSITY INITIATIVES

Alwar district lies in the Aravalli hill ranges and dense forests that covered this watershed were an integral part of the rural economy until the 1930s when the colonial government abolished communal rights of forestland and allowed timber companies to exploit their resources. Presently, the forests are not uniformly distributed in the Arvari catchment.

6.1. Policies and Laws

National Forest Policies and Environment (Protection) Act enunciated by the Government of India from time to time have played an important role in the management and conservation of forests all over the country including all states. Aravari basin is directly effected by the notification issued by the Government of India in 1992.

6.1.1 Notifications

The Ministry of Environment and Forests, Government of India issued a notification on May 7, 1992 and cited following regulatory framework:

- Under Environment (Protection) Rules 1986 restricting certain activities in specified area of Aravalli Range, which are causing Environmental Degradation in the region.
- A Notification under the Environment (Protection) Act, 1986 inviting objections against restricting certain activities in the specified area of Aravalli Range, which is causing Environmental Degradation in the Region, was published in the Gazette of India. In exercise of the powers under the Environment (Protection) Act, 1986 (29 of 1986) the Central Government hereby prohibits the carrying of the following process and operations, except with its prior permission, in the areas specified as follows:
  (i) Location of any new industry including expansion modernisation;
  (ii) (a) All new mining operations including renewals of mining leases.
(b) Existing mining leases in sanctuaries / National Parks and areas covered under Project Tiger and or
(c) Mining is being done without permission of the competent authority.

(iii) Cutting of trees.

(iv) Construction of any clusters of dwelling units, farm houses, sheds, community centres, information centres and any other activity connected with such construction (including roads, a part of any infrastructure relating thereto);

(v) Electrification (laying of new transmission lines).

- Any person, who desires to undertake any of the above-mentioned processes or operations in the said areas, should submit an application to the Secretary, MoEF, New Delhi in the prescribed application form. He/she shall also furnish an Environment Impact Statement and an Environmental Management Plan along with the application and such other information as may be required by the Central Government for considering the application.

- Areas where carrying on of processes and operations without permission is prohibited:
  I. All reserved forests, protected forests or any other area shown as “forest in the land records maintained by the State Government on the date of this notification in relation to Gurgaon District of Haryana and the Alwar district of Rajasthan.
  II. All areas like Gair Mumkin Pahar, Gair Mumkin Rada, Gair Mumkin Behed, Banjad Beed and Rundh in the lands records maintained by the State Government as on the date of this notification in relation to Gurgaon district of Haryana and Alwar district of Rajasthan. (See Annexure IX)

As per the notification under the Environment (Protection) Act, 1986, inviting objections against restricting certain activities in the specified area of Aravalli Range, which is causing environment degradation in the region. People say that it is not being implemented properly as found that several mining operations are being carried out in Jamuwa Ramgarh Sanctuary, Sariska Tiger Reserve and in regions which cover some part of Arvari basin. The copies of the petition filed in
the Supreme Court by the residents of Mallana village and other noted environmentalists along with the letter written to various concerned Ministries and departments regarding the illegal mining going on in the Jamuwa Ramgarh Sanctuary and Sariska Tiger Reserve are enclosed in Annexure X).

6.1.2. Research Studies

A study of the legal implications of community-based conservation mentions that forest and wildlife related laws in the state of Rajasthan have very few statutory provisions that facilitate community participation. The Central constitutional amendments on panchayats (1993) could have facilitated direct involvement of local people in the management and preservation of natural resources but the Rajasthan Panchayat Act which followed, does not appear to give much power to village institutions regarding local natural resources (Upadhyay, 1999).

<table>
<thead>
<tr>
<th>Box 6. Legal Hurdles and opportunities</th>
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<tbody>
<tr>
<td>Upadhyay (1999) studied the legal hurdles and opportunities for CBC in Rajasthan, with reference to Bhaonta-Koylala initiative as a reference point. He assessed a majority of the laws and policies that govern the forest and wildlife in the state of Rajasthan, including central ones like the Wild Life (Protection) Act 1972, the Indian Forest Act 1927, the Forest Conservation Act 1980, the Panchayat (Extension to scheduled Areas) Act 1996, the Forest Policy 1988, the national Wildlife Action Plan 1983, the National Conservation Strategy, circulars and notifications regarding Joint Forest Management (JFM), Social Forestry and Ecodevelopment; and state ones like the Alwar Game Law 1913 and 1933, the Forest regulation 1921 and 1935, the Forest Grazing Rules 1921, the Rules for Regulation of Shooting in Alwar State 1941, the Rajasthan Forest Act 1953, the Wild Life (Protection) Rajasthan Rules 1977, the Ecodevelopment order of Rajasthan 1997, and the Rajasthan Panchayati Raj Act 1994. This preliminary assessment showed, that though there are certain provisions and some recent initiatives towards involvement of local communities in forest and wildlife management, there is very little in terms of statutory provisions that actually facilitate community participation. The Panchayat Act is one case in point, which now provides direct involvement of local participation in management and preservation of natural resources, though the Rajasthan Panchayat Act, which followed, does not appear to give much power to village institutions regarding local natural resources.</td>
</tr>
</tbody>
</table>
Legal possibilities for the future include:

(i) Providing legal back-up to the Government Order regarding JFM; one way to do this would be to declare such forests under Section 28 of the Indian Forest Act as Village Forests, which would give local communities some degree of management control;

(ii) Utilising provisions of previous legislation (e.g. the Alwar Game Act 1913 & 1933), which does not contradict the Wild Life (Protection) Act, 1977, which could facilitate participation (e.g. through allowing grazing);

(iii) Utilising such provisions to generate new models of forest conservation and use, e.g. through the regulated harvest of non-timber forest produce from “closed areas”;

(iv) Studying the possibilities of using customary laws, especially under the options available in the Panchayat legislation.

These possibilities need to be explored by agencies supporting the initiatives in Bhaonta-Koylala.

(Source: Shresth and Devidas, 2001)

6.1.3. Government Programmes and Schemes

Aravalli’s Afforestation Project launched by Forest Department Rajasthan in the year 1992-93 with the financial assistance from OECF (Overseas Economic Cooperation Fund) Japan. Under this programme, afforestation works have been done in the area. The project was taken up with the objectives of conserving soil and moisture, checking desertification and for conservation of biodiversity of flora and fauna. It also aimed at creating employment for the locals – especially the tribals, women and the members of the Scheduled Castes and to fulfil the local demand for fuel and fodder. During implementation of this project, the forest department attempted the “people first approach” in the spirit of the National Forest Policy. This has brought significant results because at some villages like Chounsala-Padak Chhapali, village communities were involved from micro planning to the management of the forests resources.

The sanction of the project assistance for the second phase has been awaited since 1998. The funds for the second phase would have been released much earlier but for the Pokaran II nuclear tests in May 1998, which prompted the Japanese Government to slap economic sanctions on India. The Japanese think that the two years’ period has proved the sustainability of the programme. Their delegation (October 1999 in Udaipur) acknowledged the fact that the project especially the VFPMCs (Village Forest Protection and Management Committees), helped reduce the antagonism of the people towards the Government forestry schemes. “The JFM has made villagers the stakeholders. This is a big change, a
sound transformation” observed by one of the Japanese delegates (Sebastian 2000). Forest department officials supported initiatives taken by community people of Padak-Chhapali and Chounsala villages for regenerating forests on the forest land in the region. This has built up good rapport between the community people and officials of forest department.

6.2. Social and Community Initiatives for Forest Conservation

6.2.1. Sacred Groves and Orans:

As people living in arid and semi-arid areas, communities of the area were traditionally well aware of the importance of trees, forests and biodiversity and had a well established and efficient forest management and conservation system appropriate for their region. The indigenous systems of management of forests in this area were evolved long before colonial times. Some practices, traditionally adopted in Alwar region are Kakad bani, Rakhat Bani, Dev Bani (sacred grove) and Oran and Rundh or Balbani (see details in Chapter 5).

Box 7.

Orans are common lands, dedicated to a local deity or temple. These areas have traditionally been under the ownership of the temple and managed by members of the local community, who resorted to regulate use. All sorts of commercial exploitation were strictly prohibited in the Oran and the community members observed discipline in its conservation. In the post independence era, their ownership passed on to the state revenue departments, as a result, the community lost interest in its maintenance. Today, both the state and community are indisposed towards its regeneration and upkeep. Consequently, these sacred lands are over exploited and have reduced to open access resources with everyone using it without any concern for its management (Seva Mandir, 2001).

Culture and religion played a major role in developing, managing and protecting natural biodiversity and common resources. In the past there was a system of associating certain species of trees and animals with people belonging to different castes and clans (gotras). People of that particular caste / clan did not damage trees of these species e.g. felling / cutting / burning of Neem (Azadirachta indica) is prohibited for Rajputs belonging to Rathore clan. This practice is locally
called Dharadi Pratha and has been described in Chapter 5. Villagers feel that the younger generations, unfortunately is not aware of such traditions. This should be revived for conservation of local biodiversity.

6.2.2. Gram Sabhas (Lok Samitis)
The community people of Bhaonta-Koylala, Hamirpur, Samara and Padak – Chhapali villages mobilised and facilitated by the NGO - Tarun Bharat Sangh formed a functional body as gram sabha (Lok Samiti) with the agenda of village forest and water resource management. The gram sabha is used as a platform for addressing common concerns through collective action. It has an open membership, with a quorum of 22 adults who by and large represent each hamlet in the two villages. The President (adhyaksha) of the gram sabha is responsible for conducting monthly meetings. It has formulated the following regulations and rules for forest and wildlife conservation:

- No shepherd will go into the forest with an axe.
- If a shepherd is caught cutting a tree, he/she will be fined Rs. 11/-. Any person who, having witnessed such an activity fails to report it to the gram sabha shall be fined Rs. 21/-.
- No man or woman shall use an axe for collection of fuel. They will only collect dry wood.
- If wood is required for building a house or for a wedding, the person will collect it only with the permission of the gram sabha.
- The gram sabha will meet every month on amavasya (new moon day).
- In the meetings, any issue relevant to the village community will be discussed.

The gram sabha has the right to make changes in the regulations and enforce penalties. The body however, is not recognised by the State Government and has no legal backing since a formal body gram panchayat exists, although it is not functional. Gram Sabha, as a village self-institution ensures greater people’s mobilisation and participation for implementation of any community based initiatives. Final decisions are taken unanimously in the gram sabha meetings. This strengthens the stakes of the people, which has the greater ownership feeling among them. This ensures sustainability of the over-all development of the village. The existing panchayat bodies do not own this procedure and practice, which ultimately leads to the conflicting situations.
The *gram sabha* has established a village fund in which each household contributes five kg grain after the harvest for sustaining the resource development activities. The *Gram Sabha of Bhaonta-Koylala* could succeed to revive its forest and water resources and now all dried well have been recharged and wildlife in the village forest has been surviving well for last ten years.

**Declaration of Bhairon Dev Lok Van Abhayaranya:** After 10 years of successful forest protection effort by local communities of *Bhaonta-Koylala*, the forest was regenerated and wildlife revived it was declared a *Bhairon Dev Lok Van Abhayaranya* (people’s sanctuary) in October 1998. The declaration of the sanctuary represents an ideological alternative to the state dominated conservation policy followed by the Forest Department. This is a unique example of a local community’s successful effort at conservation of biodiversity.

With the regeneration of forest, villagers report that a couple of leopards have started frequenting the forest. They have been lifting goats from the forest. As yet however, there did not seem to be any ill feeling among villagers. The shepherds keep a sharp vigil while grazing their sheep. The villagers claim that the disappearance of tigers and other predators from the forest was the reason behind the depletion of forests. They mention that the presence of predators will inhibit people from going into the forest unless absolutely necessary and aid the conservation process.

**Resource Availability and Livelihood Opportunities:** According to the villagers the most visible change in the village is the presence of water as indicated by the recharged wells and greenery in the village. The villagers say that after 1990, there has been a rise in agriculture productivity and two crops can be easily taken in a year. The livestock has become more productive due to the increased availability and security of fodder. Out-migration has also decreased with an increase in agricultural and pastoral production.
Hamirpur, a small village in Thanagazi tehsil of Alwar district suffered huge scarcity of water, which created desert like situation. Agriculture production went down and migration was at peak. Village women drudgery increased since most of their time was spent in fetching water from distantly (2-3 km) located source of water. The village cattle used to be shifted to other areas for drinking water. These factors led to economic deprivation of the people. With the support of TBS, village community constructed a series of earthen rainwater harvesting structures (Johad) and a big anicut named “Jabbarsagar” which aimed at socio-economic regeneration of the village community. Jabbarsagar anicut is a repository of biodiversity of fish and several bird species. The president of India arrived in

Transforming the landscape... transforming lives!

20. Cattle Egrets rendering their services to control insects in Rabi crops
21. Cultivation of Neem trees along with wheat crop.
22. Arvari brings prosperity in the area.
Hamirpur village to see the community initiatives on March 28, 2000. The President of India Mr. K R Narayanan in recognition of these efforts facilitated the Gram Sabha of Bhaonta – Koylala village with the ‘Down to Earth, Joseph C. John Award’ on March 28, 2000.

6.2.3. Arvari Sansad (People’s Parliament)

The villagers of Arvari Watershed organised themselves and formed a people’s parliament called Arvari Sansad in 1998 and formulated its rules and regulations for management of natural resources. Representatives of the 72 villages located in the Arvari watershed became members of the Sansad for managing the water resource and other natural resources of the area by adopting collective decision-making mechanism. Elected members (see Annexure V) from 34 villages of the 72 villages situated in the catchment attended the meeting. These representatives took a decision to form a 90-member parliament that would lay down guidelines concerning jal, jungle and jamin (water, forest and land). Issues like mining, forest felling, hunting and over-utilization of groundwater were discussed. A 15-member coordinating committee was formed headed by Kanhaiya Lal Gujjar (of Bhaonta) and Chajju Ram of Samara village. They were entrusted with the responsibility of preparing a guideline for resource utilisation in the catchment based on suggestion arising out of the discussions. These guidelines have been ratified by the parliament. A committee has been formed to identify those forest officials that are known for their sincerity so that the Sansad could enter into collaboration with the FD. According to the members, though there is a strong will among the villagers, forest guards could be of help in enforcing regulations. It is hoped that through a process of dialogue with the FD, a collaborative network for conservation can be built up. TBS is initially acting as the facilitator but hopes to withdraw once the Sansad has established a working office and is fully functional.

At a Sansad meeting held on 5-6 June 1999 at Samara village, the guiding resolutions for the utilisation of natural resources were finalised. Some of them are listed below:

**Direct Irrigation from Arvari River**
• No one is allowed to draw water directly from the river for irrigation, after Holi, as the lean season starts then. However, water may be drawn directly for livestock even after Holi.

• Before Holi, in the areas that are directly irrigated by the waters of Arvari, only mustard and gram may be grown. During the kharif rains, however, apart from sugarcane and rice, any crop may be grown.

Irrigation from Wells

• Only crops that require less water should be grown in the areas that are irrigated from the wells near the river.

• Vegetables are to be grown only according to local needs.

• People should be penalised for growing sugarcane and rice against the advice of the Sansad.

• The use of organic fertilizers to avoid soil degradation, damage to lands and to help retain moisture should be attempted.

Market Independent Crops Grown (Bazar mukt fasal)

• Production should be for local needs.

• Direct relations between the producers and the buyers should be established.

Sale of Water banned

• Water should not be drawn from the river using pumps.

• The waters of Arvari should not be used for commercial purposes or for mining operations.

• Digging bore wells to draw water should not be allowed in the Arvari catchment.

Save wildlife and Fish

• Villagers should keep watch over people who hunt.

• Areas that are affected by hunting are to be identified.

• A tiger protection programme should be identified, as the presence of tigers would act as a deterrent to hunting.
Identify the Areas Affected by Mining

- Put an end to all mining activities in the area.
- Lands that have suffered due to mining should be regenerated.

Ban the sale of Land

- Sale of land to outsiders should be prevented.

Increase Greenery in the Catchment Area

- There should be total ban on the cutting of green trees.
- Grazing of livestock from outside areas in the Arvari catchment should be prevented.
- Cutting of grass etc. should begin only after Deepawali, after the pastures have had a chance to regenerate during the monsoons.
- Pastures for livestock should be developed in the villages.
- Denuded hill slopes should be afforested.

Prevent Overuse of water in Arvari

- Since it is possible that the abundance of water might tempt the villagers and the government to overuse water, care should be taken to check such use and continue construction of Water harvesting structures to make the conservation effort sustainable.

Encourage traditional methods of conservation

- Revive traditional conservation methods.
- These methods should be written down by the educated youth of the region.

Role of Arvari Sansad

- Rules of the Sansad should be arrived at and enforced with consensus and discipline.
- The Sansad has been established for guiding natural resource use in the Arvari catchment.
- The Sansad should work for self-sufficiency of the village, community and for the disciplined use of the resources in the Arvari region.
6.3. TBS Initiatives

The birth of TBS took place in 1975 when K.V. Drone and Dr. S D Mishra, teachers at Jaipur got together a group of like-minded colleagues who wanted to operationalise the Gandhian philosophy. Among them was a young activist Rajendra Singh, who was stirred by the movement launched by Vinoba Bhave, a Gandhian. TBS first became active in rehabilitating a group of poor labourers whose santhies were gutted in fire. From there, their work spread to rehabilitating pavement dwellers. They held meetings and discussions. In the end however, there was a feeling of emptiness, a kind of dissonance between what was said and what was done.

Then at one of the meetings, they decided to take a plunge and moved en masse, as a group of five volunteers, led by Rajendra Singh, moved towards unknown destination and came to Thanagazi in Alwar district in 1985. One of the worst drought in history was ravaging the area, already one of the poorest in Rajasthan. They set up a base in Bheekampura and started educating the young and providing basic medical services to the villagers in Gopalpura. Then one day, Rajendra Singh, the man who had come to educate the masses learnt the most valuable lessons of his own life. The teacher was Mangu Kaka, an old man of the village. He advised Singh to revive traditional water harvesting systems if he really wanted to help the people of Gopalpura.

Thus inspired, the youth began digging a derelict and silted pond nearby. They dug and shovelled mud for months. When the rains arrived, the pond was partially filled with water and the village was convinced that they were on the right path. The work continued for three long years. The results were beyond everyone’s wildest estimates. Not only was the pond brimming, providing sufficient water to the residents of Gopalpura, the wells several kilometres downstream were recharged and full of water. Nothing succeeds like success. Other villagers were eager to replicate Gopalpura’s example. With help from the residents of Gopalpura, water harvesting began in 45 villages of the region. Their achievements in turn inspired other villages. Thus began a chain reaction powered by a coming home of sorts to traditional wisdom, rural technology and cooperation among villages.
Beginning with Gopalpura village in 1985, TBS has played a leadership and catalysing role in the building of more than 5000 Johad (water harvesting structures) with the help of the village community in 1058 villages. This area covers parts of contiguous districts of Alwar, Dausa, Bharatpur, Sawai Madhopur, Karauli and Jaipur districts. Besides this, some Johad have also been built in the district of Jaisalmer, Ajmer, Udaipur and Bharatpur. Several works related to Natural Resource Management have been taken up i.e. building of Johad (the earthen dam), anicuts, small check dams for conserving each single drop of rainwater in the drought prone area of Rajasthan, which is still facing serious drought for last four years. Till date, TBS has already made more than 5,000 Johad, anicuts and check dams and regenerated 6,500 sq km of the land. Before the water conservation work, the places like Thanagazi tehsil in Alwar which were recorded as “Dark Zone” in the government records in 1985, which means nobody is allowed to further exploit the groundwater, has been transformed into “White Zone”. All these efforts have helped in rejuvenating five monsoon rivers, namely Arvari, Ruparel, Sarsa, Bhagani-Teldeh and Jahajwali Nadi and made them perennial source of water. Now, after the work in all these villages, even after severe drought condition existing for last four years, water is there and the people are doing irrigation from the increased water table in the wells.

And now, to replicate the work done in Alwar, it has also started working in the western part of Rajasthan in the districts namely Jodhpur, Pali, Nagaur, Jalore and Barmer.

Community Development: The members of more than 1000 Gram Sabha i.e. the village institutions, Mahila Sangathans i.e. Women Groups and Yuvak Mandal i.e. Youth Groups mobilised by TBS individually and collectively discuss, decide and implement decisions collectively taken by them. The community develop and impose self-discipline for the common good of the village practicing true democracy in the management of water, forest and natural resources. They are engaged in water, forest and land conservation.

Economic Development: Construction of water harvesting structures increases and improves irrigation and crop practices leading to increase in the incomes for the household. It has also led to optimum utilisation of land and increase in livestock as well as their output of milk. This has provided a sustainable means of
livelihood to more than 1000 villages of Alwar, Sawai Madhopur, Karauli, Jaipur, Sikar, Bikaner, Tonk and Dausa districts of Rajasthan.

**Women’s Empowerment / Formation of Self-Help Groups:** Under the ‘Women’s Empowerment for Sustainable Natural Resource Management’ undertaken by TBS, 293 women’s groups have been formed of 19,250 women to take up ‘Rain Water Harvesting Work, forest conservation, education and access to basic services. In this programme, women have participated in the construction of 182 water-harvesting structures. *Tarunshalas* set up by TBS have an enrolment of 1465 children of which 70% are girls. Women’s groups have also formed their Women Banks and Cooperatives.

**Medicinal & Health Interventions:** TBS has, over the years, built up substantial knowledge of medicinal plants and have at its headquarters an Ayurvedic doctor. A first-aid ayurvedic medical kit has been distributed to women’s groups to treat ailments at a local level. TBS has also organised 75 camps to disseminate this information further. TBS has a cadre of functionaries known as *Tarun Swasthya Rakshak*.

**Activist Movement:** *Gram Sabha* led to social cohesion and collective action, which created a community, aware of its rights and willing to fight for them. With the community, TBS started a *Jungle Sanraksha Yagya* (Forest Conservation Movement) in 1991 against marble mining covering 200 sq km of forests land threatening the tiger, wildlife and forest dwellers in the *Sariska Sanctuary*. A non-violent *satyagrah march* was conducted to save the *Aravalli* in 1993; eventually mining was closed by a Supreme Court Order.

**Forest & Wildlife Conservation Efforts:** TBS has launched various movements such as ‘Grow tree save tree campaign’, ‘Save water build johad campaign’ and ‘Ganga-gangotri campaign’ for creating awareness towards saving wildlife, forest and rivers. With the cooperation of the State Education Department, TBS has launched a joint campaign to involve school children of 56 schools in conservation and protection of forest and wildlife.

**Anti-mining and Anti-poaching Campaigns:** TBS has launched people’s anti-mining and anti-poaching campaigns in *Sariska Tiger Reserve*. It had a long fight against mining since 1987, mobilised people for a non-violent Satyagrah for closing mining in March 1993, and conducted a long *Foot March* to save *Aravalli*
in October 1993. Eastern parts of Sariska were highly affected by poaching since October 1999. TBS launched people’s campaign against poachers and established dialogue with people involved in the poaching activities. It designated 10 Nahar Sewaks to save the tigers and prepared Sariska conservation groups of school children and built up their capacity to save tigers and wildlife. It also organised camps in collaboration with forest depts. and fixed strategy norms to stop poaching. Now, with the active support of TBS, a joint Task Force of forest department and local community has been formulated for protecting tigers and wildlife.

**Launching of Campaign of School Children for Wildlife Conservation:** TBS considers children as future generation to sustain present developmental activities. With the cooperation of State Education Department, a joint campaign was launched to involve children in conservation, protection activity and developed symbiotic relationship with forest and wildlife. Awareness and educating camps were organised for children of 56 schools (26 middle level, 18 Secondary and 12 Higher Secondary level) at Sariska Tiger Reserve area and established 52 Tarunshalas (Education centres) for out of school children engaged in child labour mainly for the age group 8 – 15 years. TBS also sensitised school children to grow and protect trees on agricultural lands, village lands and around their own houses.
CHAPTER 7
GAP ANALYSIS

7.1. Gaps in Information

India has a land based economy, so the importance of biodiversity becomes much more crucial for the country’s sustainable development. The policy makers and those who are engaged in decision making at various levels have not understood the value of conservation of biodiversity not only for better future generation but also for the present scenario. The basic problems such as poverty alleviation can be tackled through conservation of biodiversity and also to achieve sustainable development of bio-resources for better common future of the people. Today we focus more on development actions like construction of roads, providing of electricity, irrigation facilities and tend to neglect the natural biodiversity conservation such as management of water, forests, pastures, wildlife etc. All this has been due to inappropriate development priorities, strategies and lack of futuristic vision among the policy and decision makers, which creates a huge gap relating to natural resources extraction and consumption in comparison with conservation and regeneration of biodiversity.

7.1.1. Wild Biodiversity

Although Arvari catchment and surrounding areas is rich in wildlife, biodiversity but has not yet been surveyed and explored completely.

- Several rare endangered and endemic species like Guggal (*Commiphora wightii*) occur in the regenerated forests of Bhaonta-Koylala and Chounsala-Padak Chhapali through community Based Conservation (CBC) but proper information about such endemic and threatened species is not known.

- There are several sacred groves and Orans managed traditionally by local communities but biodiversity conservers, policy makers, planners, community based organisations (CBOs) and NGOs lack systematic information about the present status of these biodiversity rich areas.
• New exotic / alien aquatic species of both plants and animals are coming in revived and newly constructed water streams and reservoirs however; systematic information about these species is not known.

• Large quantities of chemical fertilizers and pesticides / insecticides are being used in modern farming. In Sainthal Sagar catchment, vegetables are extensively cultivated and huge quantities of chemicals and pesticides are used. The run off from the agricultural fields and reaches the water bodies. Although, harmful effects of these chemicals are well known but systematic studies of the effects of these on the aquatic flora and fauna are not available.

• Indigenous knowledge about the medicinal plants, both wild and cultivated ones, and their conservation measures has not been systematically recorded. It could be a renewal and potential resource (e.g. Ardusa - Adhatoda zeylanica which grows in denuded foothills) for income generating activities for local communities especially deprived sections and women of the society. The local communities have not understood the market value of such wild plant species.

• Local communities are not aware about the Forest and Wildlife (Protection) Acts and various notifications of the government issued from time to time and renewed.

7.1.2. Domesticated Biodiversity

• Most farmers do not use composting technique for preparing indigenous manure from cattle dung and crop residues because of lack of proper scientific knowledge. They spread untreated cattle dung and crop residues directly on agricultural land, which has less effect as manure.

• Some new hybrid varieties of crops like gram and mustard become too susceptible to frost during winters and most farmers lack knowledge about saving the crops from heavy loss. The traditional knowledge of the people was used effectively for protecting their traditional crops from the frost but it is not much effective for the new hybrid varieties.
- Information about the indigenous races of different crops still being grown in the area by marginal farmers has not been systematically assessed.

- The construction of rain water harvesting structures *Johad* / *anicuts* / small check dams at various sites of catchments of *Arvari* rivulet has resulted in increase of water table in the area and the wells which had been dried for many years have now charged once again bringing prosperity to the entire region. It has enhanced the agricultural productions and harbours a rich biodiversity with the increase in the number of birds and animals visiting the area but no systematic studies are available on this aspect and lack of adequate and reliable data and information on *Arvari* watershed.

- Information about crop weeds, their impact on crop plants and socio-economic importance has not been studied.

### 7.2. Gaps in Vision

- Conservation attempts must have the full and equal participation of local communities from the stage of conceptualisation to planning and implementation but this vision is very weak in the government functioning mechanism.

- The local community has a fundamental right to resources necessary for living and livelihood along with a responsibility to conserve these resources in protected areas and other natural habitats without external interferences. This vision in ground reality is not practiced by both community and government functionaries.

- Introduction of exotic species *Vilayati Babool* (*Prosopis chilensis*) at a large scale eroded local biodiversity and grasslands in the hilly tracts. The forest department has not visualized its economic, social and cultural impact in the region. It needs to be systematically assessed.

- Community aspirations for its livelihood aspects are not given due weightage while visioning the development programmes by the government functionaries.

- The importance of pasturelands in the rural economy primarily based on agriculture and animal husbandry has not properly visualized by the State
Government. These areas considered as tree less blanks were either released for agriculture or were planted with exotic species *Vilayati Babool* by forest department or leased for mining activities, consequently, the prime pasturelands of the region were destroyed.

### 7.3. Gaps in Policy and Legal Structure

- **Environmental Notification:** In view of the environmental degradation that was taking place in the Northern Aravallis, the Ministry of Environment and Forests, GOI issued a notification in May ’92 (*See Annexure IX*) restricting certain activities in certain specified areas. As per provisions of this notification, the environmental clearance for these activities was to be given by the MOEF. The GOI, on November 4, 1999 delegated the power to allow the activities to the State Government of Rajasthan. A direction was given to the State government to prepare a ‘Master Plan’ for integrating the environmental concerns keeping in view the future land use of the area within two years. In addition, two committees, were formed (1) State level Expert committee for giving the environmental clearance of the proposal and (2) Monitoring committee with the district collector as its chairperson. This committee is to see that the conditions stipulated at the time of clearance are followed. The state government has not so far prepared the desired ‘Master Plan’. The main purpose of the notification has been partly diluted because the state government is more susceptible to local pressures of mining, construction and industrial lobbies.

- Under the *Forest and Wildlife (Conservation) Act*, the forest department personnel feel that they are now the owners of the forest resources and the sole responsibility of the forest lies with them. They many a times treat local community badly causing physical harassment and charge hefty bribes. This indifferent attitude of forest department forces the community members to consider that forest is no more their property, because it alienates them from natural resources and they start to try and snatch as much as they can. This creates grim conflicting situations.

- Upadhyay (1999) carried out a study of legal implications of community-based conservation and noted that forests and wildlife laws in the State of Rajasthan have very few statuary provisions that facilitate community
participation (Bhaonta – Koylala as a specific example). The central constitutional amendment on *padyatras* could provide direct involvement of local participation in management and preservation of natural resources, but the *Rajasthan Panchayat Act*, which followed the central legislation, does not give much power to village institutions regarding local natural resources.

- Rich traditional system for biodiversity conservation in village community is not taken care of while formulating policies and laws related to biodiversity conservation.

- In community regulated / managed areas as is the case of Bhaonta – Koylala and Chaonsla Padak – Chhapali, there is no provision in the *Wildlife Protection Act 1972* to notify community-controlled areas as sanctuaries without communities losing their traditional rights over the resources.

- Women, besides managing their domestic chores like cooking, cleaning, spinning and grinding have to work as gatherers of fuel wood for cooking and fodder to feed the livestock. In some cases of extreme poverty, these head loads are the main source of their income. Women are therefore important stakeholders in forests. Welfare of women, therefore directly depends upon the quality and availability of forest resources. They, generally have more knowledge and awareness about different trees, fodder plants and agricultural biodiversity. Yet, they are marginalized at the time of decision-making and benefit sharing. At times, women are not even permitted to sit with men in the public meetings, although they have been given due representation in *Panchayat Raj*. Therefore, we organised several separate meetings with village women during the field study. There is a provision for constitution of separate women sub-committee for the VFPMCs. The forester of the area is supposed to organise meetings and interact with its members. He is also supposed to report their views to the general body and executive body of the VFPMC. However, in *Arvari* region it has been observed that no such committees have been formed so far. Proper interaction with the village women is difficult because the forest
department does not have women employees at the frontline level that can meaningfully interact with the village women.

- In the Arvari region, only the extremely poor men and women earn their daily income by selling head loads of fuel wood and fodder. At present no poverty alleviation programme focussed for their development is being implemented in the area.

- The Wildlife Protection Act does not provide for management of wild animal (e.g. Nilgai) populations. It provides in general for elimination of animal causing damage to property or life. There should be a check on the numbers of animals outside the forest areas. In the absence of any natural predator and availability of ideal habitats in the form of agriculture fields, the animal population has already reached menacing stage. The farmers are desperate about this mega-pest and are organising agitations against the policy of the government.

7.4. Gaps in Institutional and Human Capacity

- The farmers lack scientific knowledge about the appropriate use of chemical fertilizers and pesticides / insecticides in crops. For imparting this knowledge to the local community, there is no systematic planning available with the concerned departments of agriculture and horticulture. There is also lack of institutional support to promote organic farming among village farmers.

- Lacking information and knowledge about some of the troublesome weeds like Gajar ghas (Parthenium hysterophorus) which was introduced into the country along with consignments of PL-480 Wheat and now it is spreading rapidly in the area, even in forestlands. This has been suppressing local flora and has become alternate host to various microbial pests of local crops.

- Bodies constituted by community people like Arvari Sansad, Lok Samiti, Women’s Groups, Forest and Wildlife Task Force and VFMCs have traditional knowledge about biodiversity but they have not been imparted legal and technical knowledge on the subject in simple and communicating language.
- The local forest officials and staff seem dissatisfied with the structure of the Forest Department (FD). According to them, the FD in Rajasthan seemed to be growing without any coherence or direction as numerous posts are being created to ensure promotion. There is dissatisfaction with the status of training as well (Shresth and Devidas, 2001).

**Box 8. Problems faced by Forest Department**

The Forest department officials say that only two officers are selected annually to attend the training programme in FRI (Forest Research Institute) and WII (Wildlife Institute of India), Dehradun. This figure seems woefully inadequate for entire state of Rajasthan. According to the staff, the state govt. does not have funds to send any more personnel for training. There are several training institutes in the state. Alwar has one, but they are understaffed. Most of the faculty is on deputation and are juggled around frequently. Resource crunch does not allow the FD to arrange adequate infrastructure for its ground level staff. Some forest guards do not even have transport to carry out their duties. Many staff members get implicated in legal battles in the course of their duties. There is no legal or financial support mechanism for such cases.

(Source: Shresth and Devidas 2001)
CHAPTER 8

MAJOR STRATEGIES TO FILL THE GAPS AND ENHANCE / ATRENGTHEN ONGOING MEASURES

Addressing the socio-economic conditions of the people is the only way to create personal stakes in the maintenance and sustainable use of the biodiversity. It has been considered that the strategies would have to be based on a system of decentralized governance in conjunctions with CBOs, NGOs and State departments. For the decentralization model, the role of the CBOs / NGOs would become important in handling the biodiversity issues, running marketing cooperatives, addressing distributional equity with other agencies chipping in through provisions of necessary technical know-how skills for fund management, conflict resolution etc. The functioning mechanism of the involved agencies in the decentralized model would be participatory, transparent and accountable to the local communities.

The lessons drawn from the people’s experiences help in designing some specific principles based on which action plan is being strategized. These designing principles are as follows:

- As the TBS experience show that all strategies should be designed in such a manner that all initiatives should revolve around water resource (like construction of water harvesting structures and their management on sustainable basis) because all life forms survive in and around the water resources and socio-economic aspect of the people is directly impacted by this;

- Empowerment of the people to the extent that they start treating the common resources as their common property and take care of it;

- Local communities have rights to resources necessary for their livelihood, along with a responsibility to conserve bio-resources, without interferences from market forces (Source: Recommendations proposed in national workshop for conservation of wildlife and forests held at Sariska Tiger Reserve, September 2000);
• Inculcating and nurturing the belief among forest department officials, policy makers and environmental experts that only people can protect, conserve and regenerate the richness of the bio resources;

• Involving people rather than imposing prohibitive policies is the key to regeneration and management of bio-resources;

• Animals and plants have a fundamental right to existence. The Wildlife (Protection) Act is essential to protect this right and it is being accepted that the primary right of conservation values in protected must be recognised;

• Conservation attempts must have a full and equal participation of local communities from the stage of conceptualisation to planning and implementation;

• Efforts at conservation, social justice and sustainable development have to hand in hand along with brakes on the consumerism of the rich bio-resources;

• The complete protection of threatened biotic (both faunal and floral) elements and some areas as inviolate (e.g. groves) with the consent and participation of local communities is essential;

• Prioritising regeneration of natural bio-resources and plantation of indigenous species rather than exotic species.

Strategies:

Based on the above principles and filling gaps mentioned in Chapter 7, the following strategies are proposed by TBS to various stake holders including government departments like Panchayat, Irrigation and Forests.

• The broad strategy proposed is to organise, strengthen community groups such as Arvari Sansad, Gram Sabhas and PRIs and build their capacities to identify and address sustainable resource management including water, forest and land resources. An intensive exercise of perspective building will be taken jointly by forest department and local NGO with the community groups to create awareness of the concept of equitable and sustainable resource management.
• The specific strategy of holistic watershed perspective is followed to assure accessibility of water to the entire community and conservation of biodiversity of the area. In the process, equitable and uniform geographic distribution of water would be essential for assuring accountability of the community to revival of the bio-resources. However, sustainable strategies for linking up the village institutions with panchayats, district administration, state government development schemes will also be ensured.

• Women’s empowerment would ensure an enabling environment for building women’s groups to address the issues of biodiversity conservation. Women could be supported, by local NGOs, forest department and decision makers in building and enhancing traditional knowledge of bio-resources and they will also be supported to participate in the entire planning and resource management process in the Lok Samitis (each village will have its own gram sabha). There would be a proper representation of Women in all committees, which manage bio-resources and opinions of the women would be recorded separately in all the decision making bodies. It is very essential because the gender biased attitude prevails prominently in the village community which prohibits involvement of rural women in dealing with the biodiversity issues, although they are most concerned with these issues in their daily life for fodder, fuel needs etc.

• Identification and capacity building of social mobilizers at clusters and village level would facilitate the learning process of community groups for biodiversity issues. In this process, NGO (Tarun Bharat Sangh) can play a role of a catalyst. In the process of capacity building, the members of Lok Samitis, gram panchayat, government functionaries, other NGO workers will also be oriented to the people centres concept of watershed development, biodiversity and NRM through exposure and exchange visits.

• The village fund (Gram Kosh) of the Lok Samitis and Women’s Groups would be linked with larger development funds such as Government development schemes and other financial institutions for making the village self-reliant.

• The networking and coordinating strategy between different stakeholders and concerned departments such as forest, irrigation, watershed, animal
husbandry, health, education, mining and district administration should be established for continuous consultation / better coordination and technical support to have greater impact on the issues of watershed development, biodiversity (forest and wildlife) conservation and livestock development. It will help the implementers in integrating intersectoral issues.

- **Pasture Development:** Conservation efforts would be exercised in human impacted systems where biodiversity faces a real threat, like development and rehabilitation of the degraded lands – forests, pastures which fulfil the needs of the various sections of the community and still hold potential to maintain diversity upon their survival. The lessons could be taken from the success story of regenerating forests and bio-sources in *Bhaonta – Koylala* villages.

- **Planning of Biodiversity Conservation to be Based on People’s Aspirations and Needs:** There is a need to understand the linkage between development needs and biodiversity conservation and to address the priorities of people as regards personal and social advancement through enhancing their livelihood security, provision of basic infrastructure etc.

- **Flexibility in Development Planning:** The development planning would be kept flexible for conservation species, sites or strategies prioritised by local people that would receive matching priority at official level.

- **Making Conservation a Mass Movement:** The local people would be made to realize the worth of biodiversity present in their environs. This would entail documentation of the wealth of knowledge and skills available amongst people about wild and cultivated biodiversity. The strategy should also envisage rewarding and felicitating communities or individuals engaged in conservation or who have special knowledge about biodiversity. This would contribute greatly to motivating young and old people to keep alive the sharing and transfer of information amongst each other and initiate conservation efforts if the need arises.

- **Building the capacity** of village community people, women groups for collective actions and concerned govt. officials for developing a joint sustainable biodiversity management system through training programmes,
exposure visits etc. These will be organised by NGO / Arvari Sansad in collaboration with concerned govt. departments.

• A systematic documentation of wealth of indigenous knowledge and skills available amongst people about natural and domesticated biodiversity will be done by forest department, research organisations / local NGO working on this issue. The strategy would be designed to envisage rewarding and felicitating communities or individuals engaged in conservation or who have special knowledge about biodiversity.
CHAPTER 9

ACTIONS REQUIRED TO FILL GAPS AND ENHANCE / STRENGTHEN ONGOING MEASURES

Based on gap analysis and proposed strategies, the actions to be undertaken for implementation of BSAP in the Arvari catchment are as follows:

9.1. Actions for promoting community initiatives through capacity / strength building of the people’s groups or individuals for a sustainable natural resource management (including revival of water and bio-resources).

9.1.1. Action: Empowering Arvari Sansad (People’s Parliament) for handling issues of biodiversity, water resources, land utilization and social justice.

Category: High priority, to be carried out within 5 years.

Activities:

- Organising regular, periodic meetings of the Sansad (one day in each quarter) on building perspective about biodiversity (linkage between plants, animals and human beings) in the community and counterparts in the forest department to increase cooperation.

- Strengthening Arvari Sansad as an autonomous body with more self-financial reliance for taking decisions regarding area development and biodiversity conservation for coordination and monitoring of the activities.

- Organising workshops (2-3 days) for the members of Sansad for imparting technical knowledge for development of resources, their utilization and developing an understanding of legal and government regulatory framework (Three workshops in each year).

- Setting up Sansad’s networking with government departments (mainly field functionaries of forest and wildlife, agriculture, irrigation, health and education), NGOs, research institutions and funding agencies.

- Mobilising resources (from community, government and other funding agencies) for creation of fund for Arvari Sansad in order to sustain its activities.
• Providing continuous research and training support to the Sansad.

• Enhancing women’s participation for which extra efforts would be made (like organising separate meetings or workshops for women).

• Organising exposure visits for the members of *Arvari Sansad* in other parts of the State and Country.

**Responsibility:** The *Panchayat Raj. department* would make appropriate amendments to empower people’s bodies such as *Arvari Sansad* to effectively control and manage the natural resources.

**Time-duration:** Five years.

**Resources required:** Rs. 20 lacs.

**9.1.2. Action:** Formation of Women’s Groups and *Lok Samitis* and building their capacity for village resource mapping, micro planning and development of project proposals.

**Category:** High priority, to be completed within seven years.

**Activities:**

- Organising open discussions for rapport building in the village to have better understanding among the villages for dealing with issues related to biodiversity;

- Formation of women’s groups in 10-15 villages where these groups do not already exist;

- Formation of *Lok Samitis* (one in each village) based on the experience of *Bhaonta – Koylala* and ensuring representation of women and deprived sections of the village community;

- Organising workshops for capacity building of these groups for village resource mapping, micro-planning and preparations of project proposals and developing an understanding about village resource management, their equitable sharing on sustainable basis, legal and regulatory framework of the government, right to information and biodiversity and gender issues, setting linkages with government departments;
• Documenting and mapping biodiversity by members of Lok Samitis and women’s groups and productivity of the bio-resources in their area.

  ▪ Creating job opportunities especially for women and deprived sections by building their capacities for self-employment. For this purpose, linkages with financial organisations such as NABARD and other such institutions will be established;

  ▪ Organising exposure visits to the successful community initiatives for sustainable NRM in other areas;

  ▪ Establishing village fund in each village in order to sustain the development activities through resource mobilisation of village community and government schemes;

  ▪ Providing technical and professional support for formulating development activities such as watershed development, reviewing ongoing programmes, conflict resolutions and raising external financial resources;

**Responsibility:** Lok Samitis and Women’s Group in each village with active support of Gram Panchayat and TBS.

**Time – duration:** Five years.

**Resources require:** Rs. Ten lacs for a period of five years.

9.1.3. **Action:** Development of Joint Forest Management Approach in about 20 revenue villages where common forestland exists.

**Category:** High priority, to be completed within 10 years.

**Activities:**

• Organising discussion meetings between officials of the forest department and villagers, members of gram panchayat and Women’s groups and assessing the status of the village forest resources and people’s needs;

• Organising foot-marches (Padyatras) for consensus building on need for constituting a Joint – Forest Management Committee (JFMC) for the
management of forest resources in the protected areas (Pas) by members of Forest department, Arvari Sansad, Lok Samitis, Women’s groups. TBS to exchange information on biodiversity in agriculture, animal husbandry, forest for awareness building and its effects on conservation, employment, income etc;

- Formation of JFMC keeping proportionate representation of all sections of the village society (including women), forest officials and representatives of gram panchayat, other government departments and NGO. The JFMC should be headed by a villager chosen by the entire village and the decision making or executing body of the JFMC having equal representation of women and disprivileged classes / castes of the village;

- Preparing work plan for undertaking forest management activities and designing strategy for regeneration of existing plant species, promoting new plantation and revival of wildlife and water resources (including construction of rainwater harvesting structures), soil conservation and resource need identification;

- Setting up community - based norms and principles for forest management;

- Capacity building of members of JFMC for above activities through workshops and exposure visits to successful community or joint community – forest department initiatives;

- Evolving a participatory process for continuous reviewing of the activities and status of the forest resources. For this external professional assistance will be provided to JFMC;

- Mobilising financial resources primarily from government department and village community;

- Conducting impact study in the fifth year.

**Responsibility:** Forest department in collaboration with Arvari Sansad and TBS support.

**Time-duration:** 10 years.

**Resources required:** Rs. Two crores.
9.1.4. **Action**: Formation of *Joint Management Committees* for existing large water resources (mainly Sainthal Sagar) which is rich in biodiversity and people’s livelihood largely depends on these resources.

**Category**: High priority, to be completed within 5 years.

**Activities:**

- Formation of Sainthal Sagar Management Committee, keeping proportionate representation of government departments (e.g. Irrigation, Fishery, Forest and Wildlife and Watershed development etc.), local communities and NGO and ensuring 50 percent participation of women representatives of different sections of the society and disprivileged class for bio-resource management;

- Organising public hearings on existing government norms set for the management of the *Sainthal Sagar* water reservoir and addressing people’s livelihood, biodiversity conservation and social justice. For example the cess being collected by the revenue department on cultivation of vegetables in "Peta" (tank bed) should be utilized for the development of the *Sainthal Sagar*.

- **Creation of a Fund for Ensuring Sustainable Development of Bio-resources of the Area**: In order to create the people’s stake, the issue of economic incentives need to be addressed. People have expressed the willingness to regulate the trade of biodiversity resources at the local level through collection of cess from the traders, setting up of marketing cooperatives etc. (e.g. Cess collected from *Sainthal Sagar* goes to the government). The cess collected would be ploughed back for the improvement of the bio-resources of the area. Responsibility of this should be of the village panchayat.

- Organising workshop with the committee members for perspective planning for maintenance and further development of the water reservoir and deciding norms / rules for use of water and utilization of revenue collected from it;

- Organising awareness people’s campaign against outside hunters of migratory birds in the area.
Responsibility: Gram Panchayats, Arvari Sansad with back up support of TBS, Forest and Wildlife, irrigation, revenue departments and district administration.

Time-duration: Five years.

Resources required: Rs. 20 lacs to be managed from cess being collected from the Water reservoir by the State government.

9.1.5. Action: Revival of traditional culture and practices for conservation of biodiversity (plants and animals) in Sacred groves, sacred waters and forest areas.

Category: Medium priority, to be completed within 7 – 10 years.

Activities:

- Organising cultural activities using folklore to integrate biodiversity conservation as part of people’s life;
- Mobilising community people and forest department for promoting to grow indigenous plant species;
- Organising people’s campaign against encroachment by people in sacred groves and forests for hunting, cutting of green trees and agriculture;
- Setting up norms for sustainable use of these resources by inhabitants.

Responsibility: Lok Samitis (Gram Sabhas) to be supported by Arvari Sansad, Environment and Forest, science and technology departments and TBS.

Time-duration: 7 – 10 years.

Resources required: Rs. 7 lacs to be mobilised by TBS from government schemes, funding agencies and community contribution through Arvari Sansad.

9.1.6. Action: Capacity building of biodiversity conservers and traditional health practitioners.

Category: High priority, to be undertaken for 5 years.
Activities:
- Organising discussion meetings with biodiversity conservers such as cattle grazers, traditional seed conservers, farmers, vaidyas, women and documenting their traditional wisdom of conservation.

- Undertaking of traditional seed conservation activity for agriculture and horticulture by farmers and women’s groups to improve the agricultural biodiversity.

Responsibility: Forest and Agriculture departments in collaboration with Arvari Sansad and Lok Samities.

Time-duration: Five years.

Resources required: Rs. 5 lacs to be managed by Forest and Agriculture departments.

9.1.7. Action: Formation of a Task Force of Forest department and Gram Sabhas or Lok Samities for community based forest management.

Category: High Priority to be completed within one year

Activities:
- Constituting a Task Force for protected areas (PAs) and areas need to be protected for stopping of green tree felling and initiating and strengthening activities for wildlife conservation;

- Organising padyatras for consensus building on need for constituting a Joint Task Force for the management of forest resources in the protected areas by members of Forest department, Arvari Sansad, Lok Samities, Women’s groups, TBS to exchange information on biodiversity in agriculture, animal husbandry, forest for awareness building and its effects on conservation, employment and income etc.

Responsibility: Forest department in collaboration with Arvari Sansad.

Time-duration: Five years.

Resources required: To be managed by forest department.
9.2. **Actions for undertaking assessment studies / reviews / evaluation** on various aspects of biodiversity and impact of various development activities on livelihood of the people and ecology of the area.

9.2.1 **Action:** Inventorization of Wild floral elements (including algae, lichens, mosses, liverworts, flowering plants).

**Category:** High priority, to be completed in two years.

**Activities:**

- Preparation of vegetation grid map of the area by conducting participatory rural appraisal technique, at least for important and rare plant species to develop a baseline survey, which can be used for comparative studies in future. Since the area is of smaller size, hence interval of vertical and horizontal grids should be 3 – 5 kms;

- Assessing status of plants belonging to different groups and habitats through systematic survey of the area by experts with community involvement;

- Identification of threatened plant species, casual factors which are responsible for their status and role of these plants in the ecosystem, their utility aspects and preservation measures;

- Identification of potential plant material for creating sustainable livelihood opportunities for the people by taking benefits of the available traditional knowledge of the local people;

- Periodic monitoring of regeneration propensities of the area by using the modern techniques such as remote sensing and GIS (Global Information System).

**Responsibility:** Botany department of University of Rajasthan / Botanical Survey of India, Arid Zone circle, Jodhpur, CULP, Jaipur in collaboration with forest department and TBS.

**Time-duration:** Two years.

**Resources required:** Rs. ten lacs financial assistance to be provided by State Department of Science and Technology (DST).
9.2.2 Action: Inventorization of Wild fauna of the area (including forest and aquatic fauna).

Category: High priority, to be completed in two years.

Activities:
- Assessment of status of animal species and their role in the ecosystem by experts with active involvement of local community by using their indigenous knowledge.
- Identification of threatened species, casual factors and their utility aspects and conservation measures.

Responsibility: Zoology department of Rajasthan University or Zoological Survey of India, CULP, Jaipur in collaboration with Forest and Wildlife department and TBS.

Time-duration: Two years.

Resources required: Rs. ten lacs to be provided by State Government and Central government.

9.2.3. Action: Stopping marble mining in Kalsi-Kala village and action to rehabilitate the areas damaged by mining activities.

Category: High priority, immediate, to be completed in one year.

Activities:
- Organising public hearings on people’s rights;
- Assessing socio-economic and environmental impacts of quarrying activities;
- Identification of control measures for restoration of biodiversity of the area;
- Discussing legal and regulatory framework for any future mining activities in the region.

Responsibility: Panchayat Raj department and other associated departments of the government.
Resources required: Rs. Two crores be provided by State Government for the study and cost of rehabilitation is to be estimated which depends on the village community.


Category: High priority, immediate, to be completed in one year.

Activities:

- Conducting detailed field survey
- Analysis of the field data
- Recommending action plan to the government for development activities in the area.

Responsibility: Research organisations like Pravaran Prahari / IDS / CULP in collaboration with TBS, Forest department and Arvari Sansad.

Resources required: Rs. 1.5 lacs be provided by the State Government.

9.2.5. Action: Undertaking socio-economic impact study of the ongoing activities and status of aquatic flora and fauna (including migratory birds) in Sainthal Sagar water reservoir and role of government department and community participation in management. No further exotics to be introduced until a detailed impact is understood through studies.

Category: Medium priority, to be completed within 5 years.

Activities:

- Organising public hearings involving people from all sections of the society;
- Assessment of economic activities and revenue collected from these by government department;
- Assessment of present status of the reservoir (including its physical condition, biotic components) and role of government and communities in its management;
- Suggesting future strategy for its management.
Responsibility: Autonomous research organisation (e.g. IDS, and CULP, Jaipur) with Fisheries, Irrigation and Revenue departments.

Time-duration: Two years.

Resources required: Rs. 2.5 lacs be provided by concerned departments of State government.

9.2.6. Action: Study / review of successful community initiatives (e.g. Chounsalal, Padak-Chappali and Samara) for revival of water and forest resources (2-3 case studies) along the lines of Bhaonta – Koylala study by Kalpavriksh (Shresth and Devidas 2001).

Category: Medium priority, to be completed within 5 years.

Activities:

- Process documentation of the initiatives;
- Identification of the limitations and constraints of the initiatives;
- Lessons to be drawn for furtherance of the initiatives in larger area.

Responsibility: Arvari Sansad with professional assistance from TBS.

Time-duration: Five year.

Resources required: Rs. One lakh for each case study be provided by State government.


Category: Medium Priority to be completed in 2-5 years.

Activities:

- Organising discussion meetings with different stake holders for inviting their perceptions about the policies and rules and understanding people’s aspirations;
• Analysis of the policies and regulatory framework with regard to ground realities of the area;

• Suggesting alternative framework of the policies and modification / additions to the relevant laws for meeting the people’s aspirations.

Responsibility: An autonomous Research Organisation (e.g. IDS / Prayavaran Prehari, Jaipur), which could be identified by Forest department in consultation with Tarun Bharat Sangh.

Time-duration: Two years.

Resource Required: Ministry of Forest and Environment.

9.2.8. Action: Providing formal legal authority to the well organised people’s groups like Lok Samitis (Gram Sabha) of Bhaonta-Koylala and Arvari Sansad (People’s Parliament) whose initiatives have brought significant success for eco-restoration of the region.

Activity: Completing relevant formalities required for achieving legal status for Bhanota-Koylala forest management.

Responsibility: Forest department and panchayat Raj department in consultation with Arvari Sansad / TBS.

Time-duration: Within one year.

Resources required: Nil.

9.3. Actions for formulation and implementation of development schemes for addressing people’s livelihood and biodiversity conservation issues.

9.3.1. Action: Construction of water harvesting structures (including anicuts / farm bunds) and mobilising community people for its sustainable management (in 30-40 villages).

Category: High priority, to be undertaken immediately providing relief from the drought conditions.
Activities:

- Conducting PRA through discussion meetings with village groups (i.e. Lok Samiti, Gram Panchayat, Women’s groups) for identifying water needs of the people;
- Preparing project proposal for renovation of old water resource(s) / construction of new water harvesting structure(s);
- Designing strategy and norms for maintenance of the resource(s) and proper utilization on sustainable basis;
- Mobilising financial resources from ongoing government schemes through gram panchayat or Arvari Sansad;
- Ensuring women’s participation in the entire decision-making process and management. To achieve this, a separate women sub-committee can be formulated which will convey their decisions / recommendations to the general body of JFMC.

Responsibility: Lok Samiti to be supported by Gram Panchayat, Arvari Sansad, Watershed development and soil conservation departments.

Time-duration: Five years.

Resources required: Rs. 50000/- per water structure; 25% community contribution and remaining from Watershed Development and soil conservation departments.

9.3.2. Action: Pasture development on village common or forestlands.

Category: High priority, to be covered within 5 – 10 years.

Activities:

- Holding awareness / knowledge building camps for cattle grazers on the fodder requirement for their livestock, to develop understanding for making grazing and developing fodder plantations and pastures and improving breeds through indigenous bulls etc.
• Planning meeting with community people (i.e. *Lok Samitis* and Women’s groups, *Gram Panchayat*) for assessing their fodder requirement and potential plant species available locally for promotion in pasturelands;

• Deciding coordination strategy between different stake holders for the development of village pastureland and its management;

• Raising plantation on degraded forest land, community land and pasture land.

**Responsibility:** *Gram panchayats, women’s groups* with the support of Forest and Animal Husbandry departments.

**Time - duration:** Five years.

**Resources required:** Rs. Two crores with 10 – 15% community contribution and remaining be provided by Animal Husbandry and forest department.

**9.3.3. Action:** Implementation of afforestation programme on degraded common lands and farm forestry. Village JFM committees will undertake this.

**Category:** Medium priority, to be undertaken for 5 – 10 years.

**Activities:**

• Selection of environmentally suited technology and plant species for afforestation and farm forestry which could meet people’s need on sustainable basis;

• Orienting members of *Lok Samiti* and women’s group for taking responsibility of implementation and monitoring the scheme in their own village.

**Responsibility:** *Lok Samiti / Women group* be supported by Forest, Watershed development and Soil conservation departments.

**Time-duration:** Five years.

**Resources required:** 10 - 20% community contribution and the remaining from government development schemes.

**9.3.4. Action:** Cultivation of medicinal plants such as *Ardusa (Adhatoda zeylanica), Asavgandh (Withania somnifera), Satavar, Guggal, Kala Jiri (Vernonia*
antihelmintica) to uplift the economic and health status of the people and conservation of some of the rare species of medicinal importance.

**Category:** Medium priority, to be undertaken in 5 years.

**Activities:**

- Raising home backyard herbal gardens by village women;
- Assessment of the potential medicinal plant resources (*Ardusa* at experimental level) in natural habitats;
- Establishing linkages of community people with the local traders and assessing needs for local consumption patterns;
- Designing and implementation of procedural norms including biological monitoring for material exploitation from nature and its supply to the consumer without having a negative affect on environment;
- Organising skill training of women for raising nurseries and cultivation of medicinal plants and preparation of herbal medicines at local level;
- Building capacity of the cultivators and introducing appropriate technologies for processing of the raw material before providing to pharmaceutical companies / industries and exploring marketing of the material.

**Responsibility:** Women’s groups and *Lok Samiti* with the support of Health department (mainly Ayurvedic), Forest department and TBS.

**Time-duration:** Five years.

**Resources required:** Rs. Ten lacs.

**9.3.5. Action:** Eradication of *Vilayati Babool* (*Prosopis chilensis*) from the area in phases and using its wood for making charcoal as a source of alternate income generation by economically weaker sections of the village community and its replacement by indigenous species.

**Category:** Medium priority, 10 – 15 years.

**Activities:**

- Providing appropriate technological assistance for uprooting the plant and making charcoal;
• Making norms for marketing charcoal for income generation and ecological restoration;

• Carrying out replacement of uprooted plants by indigenous species chosen by villagers to maximise the biodiversity and livelihood gains.

Responsibility: *Lok Samitis* and women’s groups supported by Forest department.

Time-duration: 10 - 15 years.

Resources required: Rs. 5 lacs.


Category: Medium priority, 5 – 10 years.

Activities:

• Orienting farmers, cattle grazers and women for using composting Technology / technique for preparation of organic manure from cattle dung, household waste and crop residue;

• Providing earthworms at low cost with the support of *Krishi Vigyan Kendras* and Agriculture Universities in collaboration with NGOs.

Responsibility: *Arvari Sansad* and *Lok Samiti*.

Time-duration: Five years.

Resources required: Rs. 10 lacs.

9.3.7. Action: Adoption of Traditional Seed Conservation needs to revive the knowledge in the region and to learn from others experience such as *Deccan Development Society* in *Andhra Pradesh*. Changes are also needed in the public distribution system to enable the traditional seed conservation technique for promoting indigenous crops.

Category: Medium priority, 5 years.
**Activities**

- Orientation of farmers and women in appropriate seed conservation / seed storage techniques.
- Identification of local traditional deeds that are still being maintained by some farmer for their personal uses.
- Popularising the benefits of uses of seeds in the entire community.
- Providing monitory benefits to the people in the initial stages for propagation of such seeds by bye-back, etc.

**Responsibility:** Agriculture department and knowledgeable NGOs.

**Time-duration:** Five years.

**Resources required:** Rs. 2 lacs.

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**9.3.8. Action:** Appropriate use of improved technology in agriculture, horticulture, animal husbandry and other livelihood activities, which should be relevant for biodiversity conservation and improving the economic status of the people.

**Category:** Medium priority, to be completed within 5 years.

**Activities:**

- Orienting personnel of Agriculture department in acquiring or developing suitable technologies in partnership with communities and then disseminating them.
- Organising skill training for cultivators and animal rearing people;
- Conducting demonstration activities on agriculture fields.

**Responsibility:** Agriculture and Horticulture departments.

**Time-duration:** Five years.

**Resources required:** Rs. 5 lacs to be managed by Agriculture and Horticulture departments.
9.4. **Actions for integrating biodiversity components of conservation in school curriculum.**

9.4.1. **Action:** Orienting schoolteachers for the implementation of the BSAP proposed for the area through school activities.

**Category:** Medium priority, to be completed within 7 – 10 years.

**Activities:**

- Organising 2-3 day workshops with schoolteachers for developing understanding of integration of biodiversity issues in the curriculum.
- Organising exposure trips / eco-tracking / nature study camps for students, teachers and curriculum planners to make them eco-friendly and imparting experience how to deal with issue of integration of biodiversity in the curriculum;
- Developing coordinating strategy with state education department and organisations / persons already working on this issue such as CEE, local NGOs for effective implementation of the actions;
- Reviewing existing curriculum of the State.

**Responsibility:** State Education Department in collaboration with department of environment & forests.

**Resources required:** Rs. 50,000 for a course of 5 days for 100 teachers.

9.4.2. **Action:** Awareness campaigns by schoolteachers and students.

**Category:** Medium priority, to be completed in 10 years.

**Activities:**

- Celebration of the World Environment Day, World Forestry Day, World Earth day, Wildlife week, *Van Mahotsav*, Fire week etc. on regular basis in the school;
- Biodiversity melas, exhibitions, essay writing, discussions (debate), drawing competitions etc.;
• Promoting plantations in and around school premises;

• Nature study tours in the region;

• Exposure visits to areas of community based successful efforts for biodiversity conservation such as sacred groves, sacred waters, sacred hills, sacred river confluences etc.

**Responsibility:** NGOs (e.g. *TBS, CULP*) working for education of children with the technical support from agencies like Centre for Environment Education (CEE), departments of Education and Environment & Forests for actions 9.4.1. & 9.4.2.

**Time-duration:** Ten years for actions 9.4.1. & 9.4.2.

**Resources required:** Rs. 25 lacs be provided by State Departments of Forest and Environment and Education for actions 9.4.1. & 9.4.2.
CHAPTER 10

OPERATIONAL IMPLEMENTATION OF THE ACTION PLANS AND FOLLOW UP

The Strategies and Action Plans proposed in Chapter 8 and 9 are to be implemented through collaborative efforts of several organisations, mainly Tarun Bharat Sangh, Arvari Sansad, Forest Department, and other relevant government agencies, Lok Samitis / Gram Sabhas and Women’s Groups. TBS will have core responsibility of capacity building of people’s groups, mainly Arvari Sansad, Lok Samitis and Women’s groups for village resource mapping, planning and formulating activity implementation schedules of each village and setting linkages between PRIs, Forest and Wildlife department and other government agencies. TBS will be responsible for overall coordination and monitoring of the BSAP activities in collaboration with village level groups through mobilisation of Government agencies, other grassroots NGOs and Arvari Sansad. At village level, the Lok Samiti will have the sole responsibility of planning, implementation and monitoring of the programme activities. Appropriate actions for evolving a process of monitoring and reviewing or evaluation of the BSAP implementation in participatory mode such as designing monitoring indicators, continuous review and planning of the activities for taking corrective measures in time conducting, evaluation of the project and documenting case studies of the successful initiatives will be undertaken in collaboration with professional groups by the BSAP implementing agency.

Regarding external resource mobilisation, TBS and Forest department will provide continuous support to the Arvari Sansad and Lok Samitis. Other agencies like Agriculture, Horticulture, Soil conservation, Watershed development, Education departments will implement their Action Plans (as mentioned in Chapter 9) in collaboration with Arvari Sansad, Lok Samitis and Women’s groups. Women’s groups will be strengthened for participating in every activity. Detailed implementation and monitoring schedules will be worked out in the beginning of the programme by concerned agency.
The Actions proposed in SAPs of Aravalli Eco-region, Rajasthan State will be consulted, and coordinating strategies will be decided for implementation of the activities to avoid overlapping.

Operational Implementation
CHAPTER 11

REFERENCES AND BIBLIOGRAPHY


Kulhari, Dr. O.P. *et al*, 2000. *A Base line Study of Sub-programme Area in Alwar, Jaipur, Dausa, Sawai Madhopur and Karauli districts of Rajasthan*, for Women’s
Empowerment for Sustainable Natural Resource Management under Community Based Pro-poor Initiatives Programme (GOI-UNDP), TBS, Alwar.


Ram, M. 1968. Rajasthan district Gazetteers, Alwar, DDG, Govt. of Rajasthan.


Singh, Dr. Manpal, 1997. Documentation of People’s Knowledge and Perceptions about Biodiversity and Conservation at villages Mathurawat-Rajor-Garh, under Biodiversity conservation Prioritisation Project (BCPP) of Seva Mandir, Udaipur, (Raj.), TBS, Alwar.

Sharma, Dr. Satish Kumar et al, 2000. An Ornithological Survey of Sainthal Sagar (closed area) and Dangarwara Water Bodies, (Unpublished).

Sharma, Dr. Satish Kumar, 2000. A Preliminary Study of Biodiversity of Tiger Project, Sariska (Alwar) & Jamwa Ramgarh Wildlife Sanctuary (Jaipur), Rajasthan, India, Wildlife Wing, Deptt. of Forests, Rajasthan.


Shrestha, Swati and Shridhar Devidas, 2001. Forest Revival and Water Harvesting Community Based Conservation at Bhaonta-Koylala, Rajasthan, India, Kalpavriksha and IIED.


Annexure I

Field Survey / Study Team

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8. Shri Rakesh Srivastava : Lecturer (Botany) in Govt. College, Dausa.  
   Expert in Sacred grove.
9. Dr. O.P Kulhari : BSAP coordinator
Key Participants

- Members, Arvari Sansad.
- Community members of 13 villages.
- Members of Gram Sabha of Bhaonta – Kolyala.
- Members of Women's Self Help Groups.
- Officials of Forest Department (Sh. Tejveer Singh, Project Director, Sariska).
- TBS faculty and village level volunteers.
- Coordinator, Aravalli Eco-region (Sh. V. D. Sharma).
- Representative of Kalpvriksh (Ms. Kanchi Kohli).

- Experts:
  - Dr. S. Mishra (Retired Professor, Botany department).
  - Prof. M. S. Rathore, Agriculture Economist (IDS, Jaipur).
  - Dr. Rakesh K. Srivastava, Sacred Grove expert (Lecturer Govt. college, Dausa).
  - Dr. Satish Kumar Sharma, Ornitho-botanist (Range officer, Forest Department, Govt. of Rajasthan).
  - Dr. O. P. Kulhari, Taxonomist, BSAP coordinator.
  - Dr. Sudhir Upadhyay (Social scientist and CULP member).
  - Dr. Lalit Kishore (Educationist and Chairperson CULP).
  - Dr. (Ms.) Kanchan Mathur, Gender expert (Director, Women Resource Centre, RIPA).
Annexure III

Local Advisory Committee (LAC) of Arvari Sub-state BSAP

1. Shri Rajendra Singh : General Secretary, TBS, Alwar.
2. Shri V. D. Sharma : Retired PCCF, Department of Forest and Wildlife, Govt. of Rajasthan. Presently, coordinator BSAP for Aravalli Eco-region.
3. Shri Tejveer Singh : Project Director, Sariska Tiger Reserve, Alwar. Department of Forest and Wildlife, Govt. of Rajasthan.
4. Dr. O.P. Kulhari : Arvari Sub-state BSAP Coordinator, TBS. (Presently in Sandhan), Jaipur.
6. Shri Kanhaiya Lal Gurjar : Deputy Coordinator Arvari Sansad (Bhaonta-Kolyala) and Senior Faculty member of Tarun Bharat Sangh, Bheekampura-Kishori, Alwar.
8. Dr. (Mrs.) Archana Pareek : CULP, C-151, Dayanand Marg, Tilak Nagar, Jaipur.
11. Shri Virendra Singh : Teacher, Govt. Upper Primary School, Padak-Chhapali (also member of Arvari Sansad), Thanagazi, Alwar.
12. Shri Daulat Singh : Ranger, Sariska Tiger Reserve, Alwar, Department of Forest and Wildlife, Govt. of Rajasthan, Sariska, Alwar.
14. Dr. Rakesh Srivastava : Ethnobotanist and expert on Sacred groves. Presently, Lecturer in Botany, Govt. College, Dausa, Rajasthan.
15. Ms. Bhagirthi Rathore : Member of Resource Team (Health and Education) in Women’s Empowerment for Sustainable Resource
Management, *TBS, Alwar*. 
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Date</th>
<th>Place of meeting</th>
<th>Participants</th>
<th>Issues discussed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Oct. 1, 2000</td>
<td>TBS Hq. Bheekampura</td>
<td>TBS faculty members (5), Kalpavriksha representatives (2), Scientist working on biodiversity (1), School teacher (1).</td>
<td>Discussed the objectives of the NBSAP, project area, methodology, study sample, time bound Work Plan</td>
</tr>
<tr>
<td>4.</td>
<td>Nov. 6, 2000</td>
<td>Jaipur</td>
<td>Aravalli ecoregion Coordinator, experts (3) and BSAP coordinator.</td>
<td>Identified field survey team and discussed survey strategy.</td>
</tr>
<tr>
<td>6.</td>
<td>Dec. 17, 2000</td>
<td>Baranon ki Dhani – 5th Arvari Sansad Meet</td>
<td>Members of Arvari Sansad, Para teachers, Field survey team and Researchers from IDS (Total 209 persons including 40% women.</td>
<td>Presented minutes of earlier Arvari Sansad meeting. Discussed issues related to village NRM; biodiversity problems were identified.</td>
</tr>
<tr>
<td>8.</td>
<td>Dec. 17, 2000</td>
<td>Sainthal Bundh</td>
<td>Community members, Farmers and Field Management of water resource; biodiversity</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Date</td>
<td>Location</td>
<td>Participants</td>
<td>Issues and Relationships</td>
</tr>
<tr>
<td>-----</td>
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<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10.</td>
<td>Dec. 18, 2000</td>
<td>Padak-Chhapali</td>
<td>School teachers (5), farmers, gram sabha members (9) and field survey team (4). (5 Women members from Gram Sabha)</td>
<td>Conservation measures evolved by community for regenerating forest resources. <em>Dharadi Pratha</em> for conservation of tree species and animals.</td>
</tr>
<tr>
<td>12.</td>
<td>Dec. 19, 2000</td>
<td>Samara</td>
<td>Members of Arvari Sansad, members of gram panchayat &amp; cattle grazers, farmers and field team.</td>
<td>Role of Arvari Sansad, gram panchayat and women groups in dealing with issues of biodiversity conservation and NRM, particularly water and forest.</td>
</tr>
<tr>
<td>15.</td>
<td>Dec. 20, 2000</td>
<td>Raghunath-Pura</td>
<td>Women, community members, teachers, cattle grazers and field</td>
<td>Biodiversity conservation in protected areas and sacred groves through</td>
</tr>
<tr>
<td>No.</td>
<td>Date</td>
<td>Location/Details</td>
<td>Participants</td>
<td>Notes</td>
</tr>
<tr>
<td>-----</td>
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<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>18.</td>
<td>May 22, 2001</td>
<td>Bundh Borunda</td>
<td>Vegetable growers (both men and women), cattle grazers, fishermen, local community, members of Kalpavriksha, TBS workers and members of LAC.</td>
<td>Observed Wildlife in and around the Sainthal Sagar, impact of the water harvesting structures on the economic status of the local community and their role in resource management.</td>
</tr>
<tr>
<td>19.</td>
<td>May 23, 2001</td>
<td>Tarunshala Raghunath-Pura</td>
<td>Members of Arvari Sansad (both men and women), school teachers, students, cattle grazers, farmers, scientists, members of Kalpavriksha, Aravalli Ecoregion and forest department.</td>
<td>Role of the members of Arvari sansad, gram Sabhas, women Groups, Teachers and Students in managing village resources. Elicited perceptions of the people and documented (video film also prepared).</td>
</tr>
<tr>
<td>20.</td>
<td>May 23, 2001</td>
<td>Kalsi Kala</td>
<td>Members of LAC, scientists, Kalpavriksha, village community (both men and women) and schoolteachers.</td>
<td>Observed hazards being caused by a large scale mining activities in and around the village and documented people’s perceptions in a video film.</td>
</tr>
<tr>
<td>21.</td>
<td>May 23, 2001</td>
<td>TBS Hq. Bheekampura</td>
<td>Members of LAC, invited scientists, Kalpavriksha, TBS field workers.</td>
<td>A formal meeting of LAC, Arvari sub-state BSAP status was discussed and shared experiences of the LAC members.</td>
</tr>
<tr>
<td>22.</td>
<td>25 July 2001</td>
<td>Raisar (Jamwa Ramgarh)</td>
<td>5th meet of the members of Arvari Sansad. About 300</td>
<td>Presented the status of the Arvari BSAP draft and its broad findings shared.</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>Location</td>
<td>Event</td>
<td>Details</td>
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<td>---</td>
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<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>23</td>
<td>Jun. 15-17, 2001</td>
<td>TBS Hq, Bheekampura</td>
<td>A woman sammelan about 3000 women participated out of which about 500 women were from Arvari region; other participants from other gender experts, women political leaders, media persons, NGO representatives and government. This sammelan was not organized as part of BSAP process. A linkage was drawn to seek inputs from 52 women present from Arvari area.</td>
<td>Discussed village resource management issues especially biodiversity and water and participation of women and their in decision-making process at community level. Identified women’s issues and problems and tried to evolve the strategy for building the capacity of village women NRM, self-employment and biodiversity conservation.</td>
</tr>
<tr>
<td>24</td>
<td>Feb. 5, 2002</td>
<td>TBS Hq, Bheekampura</td>
<td>LAC meeting, 9 members participated.</td>
<td>Discussed BSAP draft and shared comments received from Kalpavriksh.</td>
</tr>
</tbody>
</table>
### Meetings Organised with Village Communities

<table>
<thead>
<tr>
<th>Village</th>
<th>Participants</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baranon ki Dhani (J. Ramgarh)</td>
<td>20</td>
<td>Dec. 17, 2000</td>
</tr>
<tr>
<td>Borunda (Sainthal Sagar) (J. Ramgarh)</td>
<td>35, 2-3 meetings</td>
<td>Dec. 17, 2000, May and June 2001</td>
</tr>
<tr>
<td>Sainthal Sagar (Dausa)</td>
<td>15</td>
<td>May 22, 2001</td>
</tr>
<tr>
<td>Padak-Chhapali</td>
<td>21</td>
<td>Dec. 18, 2000</td>
</tr>
<tr>
<td>Bhaonta-Kolyala</td>
<td>26</td>
<td>Dec. 18, 2000</td>
</tr>
<tr>
<td>Jaitpur</td>
<td>11</td>
<td>Dec. 19, 2000</td>
</tr>
<tr>
<td>Natata</td>
<td>9</td>
<td>Dec. 19, 2000</td>
</tr>
<tr>
<td>Samara</td>
<td>35</td>
<td>Dec. 19, 2000</td>
</tr>
<tr>
<td>Kalsi-Kala (Jhiri)</td>
<td>66, 50</td>
<td>Dec. 18, 2000, May 23, 2000</td>
</tr>
<tr>
<td>Jagnathpura (Jhiri)</td>
<td>21, 35</td>
<td>Dec. 18, 2000, May 23, 2000</td>
</tr>
<tr>
<td>Dev ka Devra</td>
<td>11</td>
<td>Dec. 19, 2000</td>
</tr>
<tr>
<td>Kaled</td>
<td>16</td>
<td>Dec. 20, 2000</td>
</tr>
<tr>
<td>Palia Kheda</td>
<td>21</td>
<td>Dec. 20, 2000</td>
</tr>
<tr>
<td>Dumoli-Khatala</td>
<td>50 (3 meetings)</td>
<td>May &amp; June 2001</td>
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## Annexure V

**Elected Members – Arvari Sansad**

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<tr>
<th>S.No.</th>
<th>Member</th>
<th>Village (Population)</th>
<th>Panchayat</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Panchayat Samiti – Thanagazi, District – Alwar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Sh. Roodaram Gurjar</td>
<td>Kankad ki Dhani (500)</td>
<td>Aagar</td>
</tr>
<tr>
<td>2.</td>
<td>Sh. Ram Kumar</td>
<td>Kankad ki Dhani</td>
<td>Aagar</td>
</tr>
<tr>
<td>3.</td>
<td>Smt. Manhar</td>
<td>Sunder ki Dhani, Bhanwta (400)</td>
<td>Aagar</td>
</tr>
<tr>
<td>4.</td>
<td>Sh. Bajrang Singh</td>
<td>Rajput ki Dhani, Bhanwta</td>
<td>Aagar</td>
</tr>
<tr>
<td>5.</td>
<td>Sh. Chhote Lal Gurjar</td>
<td>Rajput ki Dhani, Bhanwta</td>
<td>Aagar</td>
</tr>
<tr>
<td>6.</td>
<td>Sh. Gobinda Gurjar</td>
<td>Upla Guwada, Bhanwta</td>
<td>Aagar</td>
</tr>
<tr>
<td>7.</td>
<td>Smt. Mooli</td>
<td>Kolyala (300)</td>
<td>Aagar</td>
</tr>
<tr>
<td>8.</td>
<td>Sh. Arjun Gurjar</td>
<td>Kolyala</td>
<td>Aagar</td>
</tr>
<tr>
<td>9.</td>
<td>Sh. Chheeter Gurjar</td>
<td>Kolyala</td>
<td>Aagar</td>
</tr>
<tr>
<td>10.</td>
<td>Smt. Roopa Devi</td>
<td>Bhooriyawas (1000)</td>
<td>Aagar</td>
</tr>
<tr>
<td>11.</td>
<td>Sh. Bhartya Gurjar</td>
<td>Bharta ki Dhani</td>
<td>Aagar</td>
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<tr>
<td>12.</td>
<td>Sh. Hazari Lal meena</td>
<td>Radi ki Bani (300)</td>
<td>Aagar</td>
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<tr>
<td>13.</td>
<td>Sh. Kajod Gurjar</td>
<td>Chausla (500)</td>
<td>Padak</td>
</tr>
<tr>
<td>14.</td>
<td>Sh. Hari Prasad Meena</td>
<td>Chausla</td>
<td>Padak</td>
</tr>
<tr>
<td>15.</td>
<td>Sh. Hajoota Ram Meena</td>
<td>Padak (800)</td>
<td>Padak</td>
</tr>
<tr>
<td>16.</td>
<td>Sh. Badri Meena</td>
<td>Padak</td>
<td>Padak</td>
</tr>
<tr>
<td>17.</td>
<td>Sh. Raju Singh</td>
<td>Padak</td>
<td>Padak</td>
</tr>
<tr>
<td>18.</td>
<td>Sh. Mool Chand Meena</td>
<td>Padak</td>
<td>Padak</td>
</tr>
<tr>
<td>19.</td>
<td>Sh. Ram Lal Gurjar</td>
<td>Chhapali (600)</td>
<td>Padak</td>
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<tr>
<td>20.</td>
<td>Sh. Shravan Gurjar</td>
<td>Modala ki Bani (200)</td>
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<tr>
<td>21.</td>
<td>Sh. Kana Ram Gurjar</td>
<td>Aagar (500)</td>
<td>Aagar</td>
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<tr>
<td>22.</td>
<td>Sh. Khanja Ram Gurjar</td>
<td>Toda (600)</td>
<td>Pratapgarh</td>
</tr>
<tr>
<td>23.</td>
<td>Sh. Ran Chand Meena</td>
<td>Lalpura (1200)</td>
<td>Lalpura</td>
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<tr>
<td>24.</td>
<td>Sh. Kalu Ram Meena</td>
<td>Lalpura</td>
<td>Lalpura</td>
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<tr>
<td>25.</td>
<td>Sh. Ramnath Meena</td>
<td>Chaha ka Baas (1000)</td>
<td>Lalpura</td>
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<tr>
<td>26.</td>
<td>Sh. Bhaura Ram Kumhar</td>
<td>Chaha ka Baas</td>
<td>Lalpura</td>
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<tr>
<td>27.</td>
<td>Sh. Godu Ram Gurjar</td>
<td>Palasna (1000)</td>
<td>Pratapgarh</td>
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<tr>
<td>28.</td>
<td>Sh. Badri Prasad Yogi</td>
<td>Palasna</td>
<td>Pratapgarh</td>
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<tr>
<td>29.</td>
<td>Sh. Bhairusahay</td>
<td>Lothabaas (600)</td>
<td>Pratapgarh</td>
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<tr>
<td>30.</td>
<td>Sh. Kalyan Sahay</td>
<td>Lothabaas</td>
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<tr>
<td>31.</td>
<td>Sh. Teja Ram Gurjar</td>
<td>Panchbaki (400)</td>
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</tr>
<tr>
<td>32.</td>
<td>Sh. Nathu Ram Gurjar</td>
<td>Nangal (800)</td>
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<tr>
<td>33.</td>
<td>Sh. Arjun Gurjar</td>
<td>Nangal</td>
<td>Lalpura</td>
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<tr>
<td>34.</td>
<td>Sh. Omprakash Nirlep</td>
<td>Pratapgarh (4000)</td>
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<td>Sh. Kishan Lal Meena</td>
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<td>Pratapgarh</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Village (Population)</td>
<td>Location</td>
</tr>
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<td>Sh. Gopiram</td>
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<td>Sh. Panna Lal</td>
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<td>Sh. Prabhu Dayal</td>
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<td>42</td>
<td>Sh. Ramprasad</td>
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<td>Sh. Prabhu Singh Meena</td>
<td>Chakiparoki (300)</td>
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<td>44</td>
<td>Sh. Gajraj Singh</td>
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<td>Sh. Bhola Ram</td>
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<td>Sh. Jagdish Gurjar</td>
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<td>Sh. Chhaju Ram Gurjar</td>
<td>Sandaya (150)</td>
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<td>Benada ki Dhani, Kalaid (200)</td>
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140
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New Members Elected in the 2nd Adhivasan (16 February 1999) of Arvari Sansad at
Paddak

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**Annexure VI**

Rainwater harvesting structures, bundhs, anicuts constructed by communities with the support of Tarun Bharat Sangh (Patel, 1997)

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Annexure VII

A. Wildlife of Arvari Catchment
(Based on observations of Forest Range Officer and Wildlife Expert in the area)
(VR = Very Rare; R = Rare; C = Common; FC = Fairly Common; A = Abundant
Re = Resident; W = Winter Visitor; S = Summer Visitor; M = Monsoon Visitor; V =
Presumed Vagrant; ? = Uncertain Status; B = Confirmed Breeding)

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<td>Ardea cinerea</td>
<td>Grey heron</td>
<td>R</td>
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<td>92.</td>
<td>Ardea purpurea</td>
<td>Purple heron</td>
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<td>93.</td>
<td>Mesophoys intermedia</td>
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<td>Bubulcus ibis</td>
<td>Cattle egret</td>
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<td>95.</td>
<td>Ardcola grayii</td>
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<td>96.</td>
<td>Threskiornis melanocephalus</td>
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<td>97.</td>
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<td>103.</td>
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<td>Corvus splendens</td>
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<td>Red rumped swallow</td>
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<td>114.</td>
<td>Pycnonotus sinensis</td>
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<td>115.</td>
<td>Pycnonotus cafer</td>
<td>Red vented bulbul</td>
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<td>116.</td>
<td>Prinia hagedsonii</td>
<td>Grey breasted prinia</td>
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<td>117.</td>
<td>Prinia sylvestica</td>
<td>Jungle prinia</td>
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<td>118.</td>
<td>Prinia socialis</td>
<td>Ashy prinia</td>
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<td>119.</td>
<td>Prinia inornata</td>
<td>Plian prinia</td>
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<td>123.</td>
<td>Chrysomma sinense</td>
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<td>124.</td>
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<td>126.</td>
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<td>Mirafra crythroptera</td>
<td>Indian lark</td>
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<td>130.</td>
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<td>131.</td>
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<td>132.</td>
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<td>Passer montanus</td>
<td>Eurasian tree sparrow</td>
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<td>137.</td>
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<td>138.</td>
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<td>142.</td>
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<td>143.</td>
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<td>145.</td>
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<td>Scarlet Minivet</td>
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<td>146.</td>
<td>Rhopidura aureola</td>
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<td>147.</td>
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<td>White-Bellied Drongo</td>
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<td>149.</td>
<td>Terpsiphone paradisi</td>
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<td>150.</td>
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<td>Common Iora</td>
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<td>151.</td>
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<td>152.</td>
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<td>Red-Breasted Flycatcher</td>
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<td>153.</td>
<td>Cyornis tickelliae</td>
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<td>155.</td>
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<td>Oriental Magpie-Robin</td>
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<td>156.</td>
<td>Saxicoloides fulicata</td>
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<td>157.</td>
<td>Phoenicurus ochruros</td>
<td>Black Redstart</td>
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<td>158.</td>
<td>Saxicola maura</td>
<td>Siberian Stonechat</td>
<td>Re</td>
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<tr>
<td>159.</td>
<td>Saxicola caprata</td>
<td>Pied Bushchat</td>
<td>Re</td>
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<td>160.</td>
<td>Saxicola ferrea</td>
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<tr>
<td>161.</td>
<td>Oenanthe deserti</td>
<td>DesertWheatear</td>
<td>Rare</td>
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<tr>
<td>162.</td>
<td>Cercomela fusca</td>
<td>Indian Chat</td>
<td>Re</td>
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<tr>
<td>163.</td>
<td>Sturnus malabaricus</td>
<td>Chestnut-Tailed Starling</td>
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<tr>
<td>164.</td>
<td>Sturnus pagodarum</td>
<td>Brahminy Starling</td>
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</tr>
<tr>
<td>165.</td>
<td>Sturnus roseus</td>
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<td>Rare</td>
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<td>166.</td>
<td>Sturnus vulgaris</td>
<td>Common Starling</td>
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<td>167.</td>
<td>Sturnus contra</td>
<td>Asian Pied Starling</td>
<td>Re</td>
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<td>167.</td>
<td>Acridotheres tristis</td>
<td>Common Myna</td>
<td>Re</td>
</tr>
<tr>
<td>168.</td>
<td>Acridotheres ginginianus</td>
<td>Bank Myna</td>
<td>Re</td>
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<tr>
<td>169.</td>
<td>Parus major</td>
<td>Great Tit</td>
<td>Re</td>
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<td>170.</td>
<td>Riparia paludicola</td>
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<td>Re</td>
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<td>171.</td>
<td>Hirundo concolor</td>
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<td>172.</td>
<td>Hirundo rustica</td>
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<td>173.</td>
<td>Lonchura malabarica</td>
<td>White-Throated Silverbill</td>
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<td>174.</td>
<td>Melophas latham</td>
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<td>175.</td>
<td>Emberiza buchanani</td>
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<td>176.</td>
<td>Emberiza stewart</td>
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**Reptiles**

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<td>Calotes versicolor</td>
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<td>4</td>
<td>Riopa punctata</td>
<td>Snake Skink</td>
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<td>5</td>
<td>Varanus bengalensis</td>
<td>Common Indian Monitor, Goh</td>
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**Notes:**
- **W**: Winter
- **R**: Rare
- **V**: Very common
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<td>Eryx johnii</td>
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<td>E. conicus</td>
<td>Russell’s Earth Boa</td>
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<td>Xenochropis piscator</td>
<td>Checkered Keelback, Pani –ka-Sanp</td>
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<td>Spalerosophis diadema</td>
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<td>Ptyas mucosus</td>
<td>Ratsnake, Gurha</td>
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<td>Naja naja</td>
<td>Indian Cobra, Kala-sanp</td>
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<td>Echis carinatus</td>
<td>Saw-scaled Viper</td>
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### Amphibians

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<td>Limnonectes limnocharis</td>
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<td>Occidozyga cyanophlyctis</td>
<td>Skipping Frog</td>
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<td>4.</td>
<td>Tomopterna breviceps</td>
<td>Burrowine Frog</td>
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<td>Bufo melanostictus</td>
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<td>B. Stomaticus</td>
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### Insects

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<td>Anthia sexaguttata</td>
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<td>16.</td>
<td>Apis dorsata</td>
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<td>17.</td>
<td>Mylobris sp.</td>
<td>Of Yellow colour</td>
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<td>18.</td>
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### Molluscs

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<td><strong>Lymnaea acuminata</strong></td>
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<td><strong>Indoplanortis exustug</strong></td>
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<td><strong>Bellamya bengalensis f. typical</strong></td>
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**Butterflies**

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<td>6.</td>
<td><strong>Junonia heirta</strong></td>
<td><strong>Yellow Pansy</strong></td>
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</table>

**Common Spiders:** **Plexipus paykullu, Marpissa sp., Sparassus sp., Scytodes sp.**

**Annelida – Earthworms** *(Metaphire posthuma)*
### Annexure VII

**B. Naturally Occurring Plants (Flora) in Arvari Catchment**  
(Based on Primary Field Work)

**Habit:**  
- **T** = Tree;  
- **S** = Shrub;  
- **H** = Herb;  
- **Cl** = Climber;  
- **Cr** = Creepers.

**Habitat:**  
- **P** = Plains;  
- **Hi** = Hills;  
- **S.D** = Sand Dunes;  
- **Ag.F** = Agriculture Fields;  
- **W** = Weeds;  
- **Cu** = Cultivated;  
- **F** = Forest.

**Status:**  
- **F** = Frequent;  
- **C** = Common;  
- **A** = Abundant;  
- **R** = Rare.

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<td>Padalsi / Ashwagandha</td>
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<td>Kala satta</td>
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<td>Ber ki jhari</td>
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<td>Hans Raj</td>
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