# PASTURE DEVELOPMENT AND MANAGEMENT IN TAANK VILLAGE

## 1. INTRODUCTION

Poor and tribal communities living in remote areas have always been dependent upon common natural resources. Modern development paradigm has led to a steady degradation of these commons, which in turn has had an adverse effect on livelihoods of the poor communities. Attempts have been made to regenerate these commons through collective action. This case study documents one such attempt in village Taank of district Udaipur.

Hanuman Van Vikas Samiti (HVVS) is a voluntary organisation registered under Rajasthan Registration Act 1958. It has been carrying on development activities since 1986 in backward and tribal areas of Bhinder and Girwa blocks in District Udaipur. HVVS believes that people's livelihoods can be improved by increasing their participation in management of natural resources through their empowerment and capacity building. The agency has been working on pasture development in Taank village of Maal Ki Tus panchayat to operationalise this concept. This case study looks at the processes, experience, problems, and emerging lessons of pasture development in this village.

The next section describes the socio-economic conditions in the village, then section 3 describes the project undertaken: origin of the project, its objectives and project design. Section 4 deals with implementation of the project, which was associated with a number of social processes, including vested interests putting up opposition. Management, rules and protection system are described in section 5. Social and community dynamics, being of critical importance, are dealt with in section 6. Section 7 described how much fodder has been produced, how it has been utilised and the contribution it has made to the fodder economy of Taank. Section 8 deals with the impact of the programme, including both physical and social benefits. This is followed in section 9 by a discussion of issues that cropped up during the programme. Finally, section 10 identifies lessons emerging from the experience.

## 2. THE SOCIO ECONOMIC CONTEXT OF TAANK VILLAGE

Udaipur district is a semi-arid area with an average rainfall of 625 mm. The district falls in agro climatic zone IV A. Terrain is mostly hilly in the west and opens out into plain towards east. Main crops during rainy season are maize, *urad* and groundnut. Wheat and gram are cultivated in Rabi season.

Taank is a tribal majority village of Vallabhnagar tehsil in District Udaipur. It is located south east of district headquarters, 5 kms. south of Sakroda which is a large village on Udaipur Kurabad road. The village population is 1373 divided into eight hamlets. The main settlements are Dewa Talab, Bari Talab, Bara, Napania, Phooti Talai, Naya Kheda, Dhaba Rela, and Taank. On the history of Taank village, Maangi Lal Gameti, a local resident, said that the village was settled by Dewra Rajputs 200 years ago. After some time Jhala Rajputs and Nanu Ram Gameti, a Bhil from Jara Mines also settled in the village. Owing to clashes between Jhalas and Dewras, the

latter left the village and settled in Sakroda. Their lands were taken over by Jhalas. The 187 families of Bhils currently living in Taank are all descendants of Nanu Ram. Besides Bhil and Rajput, the village is also inhabited by Gaayri, Meghwal, Naath, and Bairagi communities. Some basic facts about the village are given in the following tables.

**Table 1 Land Use in Taank Village**

| *Households* | *Population* | *Land Classification (in bighas)* | | | | | |
|---|---|---|---|---|---|---|---|
| | | Unirrigated | Irrigated | Private Pasture | Common Pasture | Revenue | Total |
| 260 | 1373 | 327.25 | 159.75 | 1168 | 410 | 610 | 2775 |

Source : Revenue records

**Table 2 Livestock in Taank Village**

| *Cows* | *Bullocks* | *Buffaloes* | *Goats* | *Sheep* | *Others* | *Total* |
|---|---|---|---|---|---|---|
| 703 | 225 | 170 | 1552 | 89 | 81 | 2820 |

Source : Household survey done by HVVS[1]

Bhil and Rajput are the main castes of the village. Numerically Bhils are largest followed by Rajputs (see Table 3). However Rajputs have historically enjoyed social and political dominance, and they continue to be strong politically and economically. Poverty, illiteracy, and lack of awareness ensure a subservient role for tribals, in spite of their numerical dominance. Table 3 shows the distribution of land amongst the major communities in Taank, which is inequitable:

- On an average, Rajput households have almost twice as much agricultural land as the Bhils;
- This disparity increases further if we consider only irrigated land. While average irrigated land per household is 1.29 bighas for Rajputs, it is only 0.49 bighas for Bhils.
- Within Rajputs also there is stratification. Some Rajput families have very high amounts of land. Thus while nearly half the Rajput families fall in the category of small and marginal farmers, three have landholdings exceeding 40 bighas.

**Table 3 Land Distribution Amongst Communities in Taank**

| ***Sl*** | ***Caste*** | ***No. of households*** | ***Land holding (bighas)[2]*** | | | |
|---|---|---|---|---|---|---|
| | | | Irrigated | Unirrigated | Pasture | Total |
| 1 | Bhils | 178 | 88 | 200 | 727 | 1015 |
| 2 | Rajputs | 49 | 61 | 85 | 393 | 639 |
| 3 | Gaairi | 7 | 3.5 | 18.75 | 89.25 | 111.5 |
| 4 | Meghwal | 7 | - | 5.5 | 15 | 20.5 |

[1] The survey reveals a large increase in the cattle population from the earlier (1990) figures available with the HVVS. This increase has not been substantiated by visual observations / experience during the last ten years: the discrepancy is being investigated.

[2] There are approximately five bighas in a hectare.

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | Naath | 5 | 1 | 2 | 13.5 | 16.5 |
| 6 | Bairaagi | 5 | 1.25 | 1.5 | 20.5 | 23.25 |
| 7 | Others | 9 | 5 | 14.5 | 10 | 29.5 |
| | Total | 260 | 159.75 | 327.25 | 1268 | 175.25 |

Livestock is another major resource. Table 4 gives livestock ownership amongst various communities in Taank.

**Table 4 Livestock Distribution amongst Various Communities in Taank**

| *Sl* | *Caste* | *No. of House-holds* | *Livestock* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | *Cows* | *Bullocks* | *Buffaloes* | *Goats* | *Sheep* | *Others* | *Total* |
| 1 | Bhils | 178 | 530 | 116 | 89 | 1403 | - | - | 2138 |
| 2 | Rajput | 49 | 109 | 58 | 56 | 11 | - | - | 240 |
| 3 | Gaairi | 7 | 7 | 11 | 2 | 86 | 89 | 81 | 276 |
| 4 | Meghwal | 7 | 14 | 9 | 9 | 13 | - | - | 45 |
| 5 | Naath | 5 | 11 | 8 | 6 | 19 | - | - | 44 |
| 6 | Bairaagi | 5 | 11 | 13 | 4 | 10 | - | - | 38 |
| 7 | Others | 9 | 21 | 10 | 4 | 4 | - | - | 39 |
| | Total | 260 | 703 | 225 | 170 | 1552 | 89 | 81 | 2820 |

There are a number of distinctive features of livestock holdings amongst various castes in Taank village. While Bhils have as many as 12 animals per household, most of these are goats which are less dependent on ground forage, and more on browsing leaves of trees and shrubs. In contrast, livestock holdings of Rajputs consist mostly of cattle and buffaloes. The economically weaker sections have a large number of low productivity animals, hence the animal ownership pattern *per se* does not correctly represent the economic condition of the farmer. Gaairis, a pastoral community, have a large number of animals - 39 per household.

## 3. TAANK PASTURE DEVELOPMENT PROGRAMME

The village came in contact with HVVS in 1990. First Lal Singh, a ward member, contacted HVVS and asked it to work in the village. To get better results, HVVS insisted on people's participation from the very beginning. In 1990-91, HVVS organised an awareness camp in the village in which 35 people participated. It was decided in this meeting to conserve the village pasture by removing illegal encroachments and stopping illegal quarrying. The idea of safeguarding a common resource from eventual destruction through development of pasture originated in this meeting.

### 3.1 Reasons for Pasture Development

Villagers have always been attracted towards land, and have a tendency to take under their possession as much land as possible. Before the beginning of conservation efforts, the village pasture had been encroached upon by 30 families that occupied 92 bighas of land. In addition, soapstone was being extracted illegally by a person from

the village. The initiative to conserve pasture land arose from a desire to put a stop to illegal encroachments and protect land from indiscriminate destruction.

The objectives of pasture conservation can be stated as:

- to increase availability of fodder and fuelwood in the village
- to safeguard pasture from encroachments and illegal quarrying
- to increase community participation in its conservation
- to develop habits of conservation and development of individual and common natural resources

### 3.2 Community Participation

Before beginning pasture development work, the question of people's participation was discussed. It was decided that the local community would contribute 20% in the form of wage labour. In addition the community would also assist in identification of local species for plantation, plantation of saplings, and construction of boundary wall. These decisions helped in ensuring cooperation of local people in pasture development. As animal husbandry tasks (like giving fodder to animals, and their general upkeep) is mostly the responsibility of women, they were especially involved. Their suggestions were taken into consideration. The work was financially supported by Society for Promotion of Wasteland Development, New Delhi.

### 3.3 Current and Past Status of Conserved Land

Taank has a total of 410 bighas of village pasture land which is registered as the village pasture of Taank village in Mal Ki Toons panchayat in revenue records. East of this land lies the residential settlement of Taank village, in the west is Karget village, in north Sakroda village, and in the south Falet village. Because of contiguous boundaries of other villages in west, north, and south, the pasture faces pressure of grazing and encroachment from these directions. Nearly 50 - 60 years ago, the land was covered by thick forests. There was no shortage of fodder and water. There were wild animals also. Even during years of drought and low rainfall, water and fodder would be available easily.

Local elder Laloo Gameti says that during the princely period, villages around Taank were under the control of Sakroda thikana. However Taank was under the direct control of State of Udaipur. After independence and constitution of a new state, the village first became part of Sakroda panchayat. Later when panchayats were reconstituted it became a part of Gupri panchayat and then Mal Ki Toons.

After independence, Forest Department issued permits for tree felling on forest land that lies adjacent to the village pasture. This led to tree felling on pasture land also. Within some years, all the land was denuded. Uncontrolled tree felling led to degradation of pasture land and lowered productivity. While earlier this land met fuel and fodder needs of human and animal population of the village, it was unable to do so in the changed circumstances.

### 3.4 Criteria for Selection of Land

Out of 410 bighas of common pasture land, it was decided to take up 230 bighas (about 50 ha.) for conservation. This land was some distance from Taank and adjacent to the neighbouring village of Sakroda. It was being encroached by people from Taank, who lived close to the pastureland, and by villagers from outside Taank. Villagers from Sakroda used to send their animals for grazing on this land; and illegal quarrying was also taking place there. The people who were benefiting from the land prior to beginning of conservation efforts can be understood through Table 5.

**Table 5 Beneficiaries before Conservation**

| *Sl* | *Description of beneficiary* | *No. of beneficiaries* | *Amount of benefit* |
|---|---|---|---|
| 1 | Wage labourers on soapstone quarry | 10 | Rs. 44,000 pa |
| 2 | Encroachers on land | 30 | 5 tones of grass pa |
| 3 | Quarry contractor | 1 | Rs. 138,000 pa |

### 3.5 Attitudes of Other Communities/Villages

The process of pasture development met different reactions from beneficiaries before conservation and inhabitants of neighboring villages. People benefiting from illegal quarrying tried to obstruct the process of encroachment removal by inciting villagers against the scheme. They tried to break the unity of the village. Inhabitants of neighbouring villages whose animals were denied entry for grazing in the pasture also opposed the project.

### 3.6 Salient Features of Village Pasture

Biophysical information on the pasture is given in Table 6, including vegetation visible there after protection was initiated.

**Table 6 Botanical and Geographical Features of Village Pasture**

| *Area of village pasture* | *Conserved area* | *Soil depth* | *Nature of terrain* | *Types of vegetation* | | |
|---|---|---|---|---|---|---|
| | | | | Grasses[3] | Trees[4] | Shrubs |
| 410 bighas | 50 hectares | shallow | hilly and undulating | dhaman, hiran, laaparya | dhaak, neem, desi babool, runjh, bamboo, kaant, kanji, khirni, aanwal, and amna | ber |

## 4. PROGRAMME IMPLEMENTATION

The work started with construction of a masonry stone wall around the plot of 218 bighas. Then soil and water conservation activities started. The activities under this

[3] Dhaman grass is *Cenchrus ciliaris*, and Hiran is *Chrysopogon fulvus*.
[4] A list of the botanical names of trees is given in Annexure 1.

head were construction of gully plugs, check dams, digging of trenches, pits, and plantation of saplings. Details of these works, employment generated, and expenditure incurred are given in Table 7.

The table shows that a total of 11530 person days of employment were generated. Out of this, 75 percent of the work was undertaken by women. The labourers were paid at the then prevalent minimum wage rate of Rs. 22 per day. A total of Rs. 3,14,554 were paid as labour payment. No differentiation was made between men and women in wage rates. Local contribution was 20 percent.

**Table 7 Details of Physical Works Carried out on Village Pasture**

| *Duration* | *Work description* | *Amount (nos.)* | *Measurement (cu. m.)* | *Employment (person days)* | *Total expenditure* | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | *SPWD* | *HVVS* | *Local contribution* | *Total* |
| Jan 94 to Dec 94 | Boundary wall | | 165.0 | 330 | 7040 | 32110 | 7830 | 46980 |
| | Gully plugs | 16718 | 817.7 | 2016 | 44356 | | 8871 | 53227 |
| | Trench and pits | 33436 | 13530.0 | 7884 | 173436 | - | 34687 | 208123 |
| | Plantation of saplings | 30000 | - | 1300 | 57612 | - | 11522 | 69134 |
| | Total | | | 11530 | 282444 | 32110 | 62910 | 377464 |

Technical parameters guided selection of these works: the design was prepared by AFPRO and approved by SPWD. Trenches and gully plugs were taken up, keeping in mind the objectives of regeneration of local species, high survival rate of planted saplings, and increase in groundwater level. To protect pasture land from open grazing and encroachment, a masonry boundary wall was constructed. To ensure supply of fodder during drought, increase of fuelwood, and maintain ecological balance, 30000 saplings were planted. Out of these 24.3 percent survived. Description of trees that survived is given in Table 8.

**Table 8 Trees that Survived**

| ***species*** | *Bamboo* | *Kala sirus* | *jamun* | *neem* | *subabul* | *aanwala* |
|---|---|---|---|---|---|---|
| **numbers** | 1324 | 2009 | 278 | 1130 | 218 | 142 |
| ***species*** | *Kanji* | *Khair* | *sitaphal* | *shisham* | *khakra* | *Desi babool* |
| **numbers** | 66 | 838 | 248 | 761 | 212 | 336 |
| ***species*** | *Harda* | *Neelgiri* | *amaltas* | *kikar* | *meetha neem* | *imli* |
| **numbers** | 6 | 114 | 24 | 77 | 12 | 333 |

TOTAL 8628 trees

The above table shows that a high number of saplings of bamboo, *kala sirus, neem, shisham, khair,* and *imli* have survived. On the other hand survival rates of *kanji, sitaphal, harda, amaltas*, and *neelgiri* have been less than 10 percent. Survival rate has depended to some extent on soil depth. Saplings planted in areas with good soil depth have fared better.

In addition to trees, better quality grasses were also seeded in the pasture. Before conservation efforts, only laaprya grew in the pasture. Seeds of dhaman and sheran were sown in the area. Now incidence of laaprya has reduced.

It should be pointed out here that there has been extensive regeneration of old root stock also. These have been systematically surveyed by forming 10 chaks (quadrats). A list of trees present on the site is given in Annexure 2.

### 4.1 Timetable of Activities

Pasture development efforts were initiated in 1991-92. Initial work comprised of removing encroachment, stopping quarrying, putting a ban on open grazing, and construction of a boundary wall. The sequence of activities taken up is given below.

| **Activity** | **Year** |
|---|---|
| Construction of boundary wall | 1991 |
| Soil water conservation work | 1994 |
| Plantation | 1994 |
| First year of grass cutting | 1995 |
| First year of tree felling | - |
| Thinning | - |
| Lopping of trees | - |

Boundary wall was constructed in the year 1991. However physical works were taken up in 1994. During the period 1991 to 1994, villagers looked after the land and enforced the ban on open grazing. During this period laaprya grass regenerated well. A number of local species also regenerated. In 1994 soil and water conservation works were taken up, followed by plantation.

In 1995, seeds of *dhaman* and *sheran* grass were sown. This was also the first year when it was decided to cut the grass collectively. Now there are thousands of trees and shrubs on this land. Vegetation is so dense that it is difficult to come out with a bundle of grass.

## 5. PASTURE MANAGEMENT – RULES, REGULATIONS & PROTECTION

The success of conservation efforts depends on having a clear set of rules and regulations, and a protection system for enforcing them. This, in turn, requires effective institutional arrangements and decision-making processes.

Responsibilities for supervision, monitoring and protection were determined at village level. Under this a committee was formed which was to supervise the whole programme. This committee was constituted by the gram sabha, and currently it has 16 members. There is no intervention by any outside agency to control its functioning. HVVS, however, does participate in committee meetings and puts forward its views for discussion. The caste-wise representation in the current committee is as follows:

| | |
|---|---|
| Rajputs | 4 members |
| Bhils | 10 members |
| Gaairi | 2 members. |

The committee members were last selected in 1996. Since then there has been no change in the committee's composition. Normally committee meets on second Sunday of every month, but at times there may be a gap of two or three months.

The committee formed to look after the programme was given following responsibilities:

- supervision of pasture and its vigilance
- ensure protection and management systems
- deciding the time when the fodder is to be cut
- deciding the system for cutting fodder, and managing the system
- resolution of conflicts
- decisions on use of pasture usufructs in collective interest.

The current rules are as follows:

1. The village will be responsible for protection and maintenance of the pasture.
2. In all restoration and repair work, one member from each household will contribute.
3. There will be no encroachment on pasture land.
4. The pasture will not be used for open grazing.
5. The chowkidar appointed for protection will be paid Rs. 500 per month. This will be paid out of the committee's income.
6. From each household one member is permitted to come for cutting the grass when the pasture is opened. The rates are Rs. 5 and Rs. 7 per headload (40-50 Kg) of grass, for Taank villagers and outsiders respectively.
7. In development works, local contribution will be 20 percent.
8. Committee will decide on whether to auction the grass or keep it for collective cutting.

9. The income received by committee from the cess on fodder and from other sources will be deposited in the bank account of the committee. All expenses incurred by committee for pasture development will be paid out of this account.
10. Committee meetings will be held every month, in which various issues related to the programme will be discussed and decisions taken.
11. The gram sabha will meet once every year. The committee accounts, including income and expenditure statement, will be placed before the villagers in this meeting. Committee will comprise of 16 members with two-year term.
12. Members will be appointed to the committee taking into account the proportion of various communities in the village.
13. All villagers have equal right on usufructs of the pasture.
14. Breach of above rules will invite imposition of penalty by the committee, which must be paid.

These rules have been formulated keeping in mind the local conditions and possible impact of various regulations. Traditional practices were also kept in mind while formulating these rules. The committee decides whether a change in the rules is needed, in consultation with the gram sabha.

Some of the important decisions taken by the committee have been: (a) change in the protection system (discussed below); (b) change in allocation of fodder produced in the pasture (see section 6); and (c) charging of a cess. So far there has been a ban on lopping of tree branches. However, because of increasing density of vegetation, discussion is in progress on changing this rule and allowing a systematic lopping operation.

Initially *suiya* method, a rotational patrol system, was adopted for protection. Under this, two village members used to go daily to the pasture to guard it. Next day *suiya* (a stick) would be placed before the houses of the people whose turn it was to patrol the pasture that day, and so on. This system continued for two years. Then the system had to be changed and a *chowkidar* (watchman) had to be appointed. The reason for this change was different stakes that different sections had in the village pasture. The well-off Rajputs, who did not need fodder from the pasture, began to lose interest in guard duty and upkeep of the pasture. Thus, the protection system began to be adversely affected. That is why a *chowkidar* had to be appointed in 1996. It was decided to pay him Rs. 500 per month. Half of this was contributed by villagers through 'village fund' and half by HVVS. This payment system lasted till 1999. Currently all the payment for *chowkidar* is being met by the 'village fund'.

Penal provisions were instituted for breaking the rules that had been formed by the committee for pasture conservation. This was done to warn potential offenders. However, as people from Taank followed rules, there has been no need to enforce these provisions. Outside villagers do sometimes indulge in unwanted activities, but this is also not very frequent. A dialogue is initiated with them and problem resolved.

## 6. SOCIAL DYNAMICS

The village dynamics can be understood through distribution of benefits amongst various groups. Village members can be classified into three sub-groups:

1. 25 percent people do not need any fodder from village pasture (as they have sufficient reserves from their own private land);
2. Another 25 percent need this fodder only in cases of drought;
3. 50 percent people are dependent on pasture for their fodder needs on a regular basis.

The first group of people are interested in auction of fodder. This group does not undertake manual labour and does not come for cutting the grass. The last sub-group is interested in collective cutting of grass. The remaining 25% are normally not interested, but develop a stake in periods of drought, when they prefer collective cutting.

Decision-making process for the programme has always been collective. As the problems cropped up, they were solved in village level meetings. The rules formed by the committee took some time to be accepted, chiefly owing to opposition from vested interests. However, as the programme picked up and benefits became clear, the community's attachment increased.

Initiation of pasture development and processes related to it has had some impact on power dynamics in the village. It has provided opportunities to the hitherto silent sections to raise their voice in favour of their interests. This is best illustrated by the change in the way the grass is allocated. In 1998 half the grass was cut and half was auctioned; whereas in 1999 (a drought year) fodder-deficient villagers insisted that no grass should be auctioned. Accordingly all the grass was cut collectively.

## 7. FODDER PRODUCTION AND UTILISATION

### 7.1 Fodder Production

Currently there are nearly 33,000 trees of various sizes on the pasture. However, there has been no lopping, except once on a small scale in 1996. So far ground fodder (grasses etc.) has been the only product from the pasture. Production of ground fodder since 1991 is given in the table below

**Table 9 Yearly Production of Fodder from Common Pasture**

| *Year* | *Production of grass in tonnes* |
|---|---|
| 1991 | - |
| 1992 | - |
| 1993 | - |
| 1994 | - |
| 1995 | 11.5 |
| 1996 | 19.0 |
| 1997 | 26.0 |

| | |
|---|---|
| 1998 | 40.0 |
| 1999 | 35.0 |

From 1991 till 1994, no grass was cut, so it is not clear how much fodder was produced in these years. Since then there were increases in fodder production every year until 1999, when there was a reduction. This was probably due to one or both of the following factors: (a) the increasing density of trees and shrubs, which are crowding out the grasses; (b) the fact that 1999 was also a year of low rainfall.

About 150 households are regularly involved in collective cutting. On average, each of these households has harvested about 200-250 kgs in recent years, for which they have had to pay the cess of 5 Rs per headload (40-50 kg). Outsiders have also been allowed to harvest some of the grass, paying a cess of 7 Rs per headload. The process of grass-cutting is monitored by the Pastureland Committee and HVVS.

### 7.2 Contribution of Common Pasture in Fodder Economy of the Village

Table 10 gives availability of fodder from different sources in 1999.

**Table 10 Availability of Fodder from Different Sources (in Quintals[5])**

| | |
|---|---|
| Lucerne fodder | 1272 |
| Dry fodder from private pastures | 1581 |
| Agriculture byproducts | 10778 |
| Village pasture | 350 |
| Total | 13981 |

### 7.3 Seasonal Availability of Fodder from Different Sources

The contribution from different sources varies over the course of a year. This seasonality is shown in Table 11.

**Table 11 Seasonal Fodder Calendar for Large Ruminants**

| *Source* | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *Jun* | *Jul* | *Aug* | *Sep* | *Oct* | *Nov* | *Dec* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| grazing on own field | | | | | | | ✓ | ✓ | ✓ | ✓ | | |
| pvt pasture | | | | | | | | | | | ✓ | ✓ |
| village pasture | | | | ✓ | ✓ | ✓ | | | | | | |
| stored agri by-products | ✓ | ✓ | | | | | | | | | ✓ | ✓ |
| purchased grass | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | |

[5] One quintal is 100 kilograms.

Villagers are of the opinion that November/December is the best time for harvesting the grass. By this time grasses have ripened and have shed their seeds, which ensures good production next year. In a fodder shortage economy, villagers are always on the look out for additional fodder.

The protected village pasture has made fodder available in the critical period of the summer months: the grass that was harvested in November or December is stored for use at this time. Nevertheless, some fodder still has to be purchased from outside for the five months March to July inclusive.

If rainfall is good, then both lactating and non-lactating animals are fed the same amount of fodder. However, this changes during drought periods when the first preference is bullocks, followed by lactating animals. Non-lactating animals get mere survival rations.

The fodder requirements of large ruminants are calculated in Table 12.

**Table 12 Fodder Requirements of Taank Village's Large Ruminants**

| *Sl* | *Animal* | *Daily requirement* | *Annual requirement (Kgs)* |
|---|---|---|---|
| 1 | Cows | @ 10 kg per head for adult cows (384x10x365) | 14,01,600 |
| | | @ 5 kg per head for calves (319x5x365) | 5,82,175 |
| 2 | Bullocks | @ 15 kg per head (225x15x365) | 12,31,875 |
| 3 | Buffaloes | @ 20 kg per head for adults (94x20x365) | 6,86,200 |
| | | @ 10 kg per head for calves (76x10x365) | 2,77,400 |
| | total | | 41,79,250 |

Thus, while every year 4179 tonnes of grass is needed, production is only 1398 tonnes which is one third of the total requirement. The balance is met either by purchases from the market or by reducing the daily intake of animals. In surveys, carried out at different locations of Rajasthan and Gujarat, HVVS has observed that the non-descript cattle are fed between 1 ½ to 3 kgs per day. The feed listed above, is that required for relatively healthy and more productive cattle (i.e. cows providing 4-6 litres of milk per day, or better type of bullock used mostly by Dangis and Rajputs). We have observed that, despite the shortage of fodder, some of the fodder is sold.

While pasture development has led to increased availability of fodder, it is still not sufficient to meet the total requirement of the village. Purchases of fodder for the weaker sections are possible only with income from wage labour. How this affects livelihood of poor families needs to be further analysed.

## 8. IMPACT OF PASTURE CONSERVATION

Conservation of pasture has ensured supply of a definite amount of fodder, which has had a beneficial impact on livestock. Various aspects of this impact are explored below.

### 8.1 Change in Number and Composition of Livestock

The table below gives the number of animals before and after conservation.

**Table 13 Impact of Pasture Conservation on Livestock**

| | *Cows* | *Bullocks* | *Buffaloes* | *Goats* | *Sheep* | *Others* | *Total* |
|---|---|---|---|---|---|---|---|
| Before | 293 | 165 | 54 | 813 | 49 | 55 | 1429 |
| After | 703 | 225 | 170 | 1552 | 89 | 81 | 2820 |

As mentioned earlier, the large level of increase has not been corroborated by visual observations or experience. The discrepancy is being examined. *Prima facie*, it appears that the earlier figures are unreliable: we are therefore refraining from drawing any conclusions.

### 8.2 Impact on Milk Production

Analysis of milk production figures before and after conservation efforts (see Table 14) shows that while total milk production has registered an increase, no significant changes in productivity are visible.

**Table 14 Milk Production in the Village Before and After Conservation**

| | *Production before conservation* | | | *Production after conservation* | | |
|---|---|---|---|---|---|---|
| | Cows | Buffaloes | Total | Cows | Buffaloes | Total |
| Lactating animals | 156 | 36 | 192 | 319 | 76 | 395 |
| Non lactating animals | 137 | 18 | 155 | 384 | 94 | 478 |
| Total | 293 | 54 | 347 | 703 | 170 | 873 |
| Milk production (kg) | 78 | 48 | 126 | 159 | 68 | 227 |

Thus we find that milk production from larger animals has increased from 126 kg to 227 kg. However, this increase has come from an increase in number of animals. In fact there has been a decline in productivity of buffaloes. Productivity of cows has remained static at 500 gms per lactating animal. This needs to be investigated further. One possible hypothesis is that increased fodder from pasture is going into the maintenance of non-productive animals. (The possible unreliability of the earlier figures of total livestock is also being explored – in a situation where livestock has not increased much, it would mean that productivity per animal has increased ).

There has been more awareness on animal husbandry issues. Death rate of animals has come down. There is also a demand for vaccination services.

### 8.3 Other Physical Benefits

There have been other significant benefits, which are listed below.

**Sale of animals** : On an average every year 15 families earn between Rs. 1500 and Rs. 2000 from sale of goats. This decreases their dependence on wage labour.

**Fodder sale** : Around a quarter of the village population (65 families) have small livestock holdings. They have surplus fodder (as mentioned above, they have poor quality animals or none at all and hence find it more worthwhile to sell the fodder than feed it to unproductive animals) and earn between Rs. 1000 and Rs. 1200 every year from its sale.

**Other benefits** : Pasture development has had other benefits like generation of wage labour. A total of 11,530 person days of employment was created. Income from auction of fodder and cess charged per bundle have led to the creation of a village fund, this has been used to pay the salary of the *chowkidar* as mentioned earlier.

**Biological and Geographical Benefits** : Biological diversity has increased in conserved area. Small wild animals like rabbits and jackal have appeared. Water table has also come up though accurate measurements have not been taken yet. However, the stream at the bottom of the plot retains water even in summer, which was not the case earlier.

**Availability of dung** : Increase in number of animals has meant availability of more dung. This would have a positive impact on agriculture production.

**Reduction in Soil Erosion** : Conservation efforts have led to a sharp reduction in soil erosion. Earlier run off from pasture used to erode agricultural fields and wash away good soil. Every year after the rains, a household would spend Rs. 500 to 600 on removing pebbles and stones from the field. This expenditure has reduced by half.

### 8.4 Social Benefits

Besides physical benefits enumerated above, conservation efforts have also had social benefits. These are discussed below.

**Increase in Social Capital**. This has been possible because of the collective nature of efforts. The efforts were undertaken by a large collective which came together on an issue. This has led to an increase in collective thinking and collective action on other developmental issues as well.

**Impact on Women's Agency** : Pasture development has been an issue of special significance for the women of the village. Higher women's participation is evidenced by the fact that 75 percent of persons who come to cut fodder are women. Current efforts have heightened their consciousness with regard to natural resource conservation. In addition, the increase in fuelwood availability will also be helpful to them as it is they who have to go out to collect fuelwood.

**BOX 1 Women Undertake Protection**

Traditionally, protection of common resources has been a male task. However, in Taank on one occasion women took the lead. This happened when women from the neighboring village of Sakroda were cutting grass from the pastureland without permission. A piquant situation arose. Intervention by men could have made the matter more sensitive. In this case women from one hamlet of Taank came out in large numbers and forced the intruders to withdraw.

Conservation efforts have provided a limited space for women to enter into public domain and engage in a discourse. There are very few fora in the village where their voice is heard. This process has been strengthened by the special steps taken by HVVS to empower women. These are: constitution of Self Help Groups of women which save on a regular basis; leadership trainings for members of these groups; and exposure tours of women. Increasing assertiveness of women with regard to pasture development can be seen by the incident described in the box below.

## 9. ISSUES IN PASTURE CONSERVATION

A number of issues came up. Some were related to technical matters and some had to do with social dynamics of the village.

- Villagers wanted to put soil behind gully plugs, as this is something they in their fields. However, SPWD advised that this was not a correct practice technically for pasture conservation, and explained that these are detention structures and not retention structures. It was also explained to the villagers that where an individual is taking responsibility for the management, the likelihood of breakages is less; whereas in a common property neglect can lead to severe damage of structures. Thus, soil was not put behind the gully plugs. However, the difference between practices for individual fields and the common land has left a doubt in the minds of the people on the quality of the work.
- While digging trenches, people opined that this would lead to a decline in fodder production, this has not been validated in practice. However, it has been seen that trenches have not had much impact on productivity in the long run - although in the short run it helped to enhance moisture availability and consequently grass was green for a month longer. The possibility of reducing or eliminating trenching work in Pasturelands, is being explored for the future, as a measure of reducing costs.
- Of the 30000 saplings planted, less than a quarter survived. This is a low survival rate. On the other hand there was large scale regeneration of local species.
- The Rajput and Bhil communities had differing views on whether to cut the grass or to auction it. While some of the Rajputs hoped to gain individually through auction, the Bhils needed the grass. However some amount of auction of grass had to take place, to provide revenue for the *chowkidar*.

## 10. LESSONS EMERGING

The process of pasture development started in 1991 and ended in 1996. The agency derived a number of lessons which will be useful in future work.

- Initially HVVS believed that processes initiated would lead to formation of an issue based village organisation. It has now realised that this is not easy because of the differing stakes of different groups in the activity.
- It has only been possible to take contribution from the wage labour class. In such situations it is not clear whether the person is willingly giving a contribution or is undertaking wage labour at reduced rates because of her/his circumstances. It should be noted, however, that those participating in wage labour have also been one of the major beneficiaries of the grass produced on the protected pastureland.
- While initially all the community comes together, over a period of time politicking starts. The vested sections opposed to the project try to sabotage it.
- Conservation of collective natural resources is possible only by enlisting the support of the beneficiaries.
- While women from one hamlet came out to protect the pasture (as described in the box above), it is not known whether women could be mobilised at the village level should another threat of this kind arise.

## Annexure 1 Botanical Names of Species

| | |
|---|---|
| 1. Runjh | : *Acacia leucophloea* |
| 2. Khakra (Dhak) | : *Butea monosperma* |
| 3. Kumta | : *Acacia senegal* |
| 4. Khirni | :*Wrightia tinctoria* |
| 5. Amaltas | :*Cassia fistula* |
| 6. Neem | : *Azadiracta indica* |
| 7. Kanja | : *Pongamia pinnata* |
| 8. Ber | : *Zizyphus mauritiana* |
| 9. Kalia siris | :*Albizia lebbek* |
| 10. Anwala | : *Emblica officianalis* |
| 11. Bans | : *Dendrocalamus strictus* |
| 12. Desi Babul | : *Acacia nilotica* |
| 13. Khajur | : *Phoenix sylvestris* |
| 14. Jamun | : *Syzgium cumini* |
| 15. Subabul | : *Leucaena leucocephola* |
| 16. Khejri | : *Prosopis cineraria* |
| 17. Sitaphal | : *Annona squamosa* |
| 18. Neelgiri | : *Eucalyptus spp.* |
| 19. Kher | : *Acacia catechu* |
| 20. Keekar | : *Pithecelobium dulce* |
| 21. Meetha neem | :*Melia azadirachta* |
| 22. Imli | : *Tamarandus indica* |
| 23. Shisham | : *Dalbergia sissoo* |
| 24. Harda | : *Terminalia tomentosa* |

## Annexure 2 Sample Survey of 10 Chaks (Quadrats)

| S.No. | Chak No. | Type of land | Name of Species | Height of Tree ( in ft.)[6] | | | | | | | Circumference of stem (in inches)[7] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| 1. | 1 | slight slope | Runjh | 7 | 10 | 5 | 1 | 2 | 1 | 3 | 8' | 8' | 8" | 8½ | 10½ | 10 ½ | 14" | |
| 2. | 2 | stream bed | Khakra (Dhak) | 2 | - | - | 1 | 1 | - | 9 | 6" | - | - | 6" | 8 | - | 12 | |
| 3. | | | Kumta | 2 | - | - | - | - | - | - | 5" | - | - | - | - | - | - | |
| 4. | | | Khanni | 1 | - | - | - | - | - | - | 3" | - | - | - | - | - | - | - |
| 5. | | | Emnna | 1 | 1 | 1 | - | - | - | - | 3" | 7" | 7" | - | - | - | - | - |
| 6. | | | Neem | 3 | - | - | - | - | - | - | 2" | - | - | - | - | - | - | - |
| 7. | | | Runjha | 1 | 1 | 2 | - | - | - | 6 | 8" | 8" | 7" | - | - | - | 13" | - |
| 8. | | | Kanja | 1 | - | - | - | - | - | - | 4" | - | - | - | - | - | - | - |
| 9. | | | Ber | 1 | 1 | - | - | - | - | - | 3" | 3" | - | - | - | - | - | - |
| 10. | | | Kant | 6 | - | - | - | - | - | - | 2" | - | - | - | - | - | - | - |
| 11. | 3 | slopy land | Neem | 1 | - | 1 | - | - | - | - | 3" | - | 4" | - | - | - | - | - |
| 12. | | | Runjha | 3 | - | 3 | - | 5 | 4 | 11 | 7" | - | 8" | - | 9" | 8" | 15" | - |
| 13. | | | Anwal | 2 | - | - | - | - | - | - | 3" | - | - | - | - | - | - | - |
| 14. | | | Kant | - | - | 2 | - | - | - | - | - | - | 5" | - | - | - | - | - |
| 15. | | | Bans | - | - | - | - | - | 1 | - | - | - | - | - | - | 3" | - | - |
| 16. | 4 | slopy | Dhak | 1 | - | - | - | - | - | - | 7" | - | - | - | - | - | - | - |

[6] Each of the columns 6 to 12 under this heading shows the number of trees of each species that come under this height category. For example, in Chak 2 there are two Khakra trees that are taller than 6 feet but less than 7 feet, and nine in the 12 feet plus category.

[7] Each of the columns 6 to 12 under this heading shows the mean girth of trees of each species that come under this height category. For example, in chak 2 the mean girth of the 6 feet plus Khakra trees is 6 inches, and that of the 12 feet plus ones is 12 inches.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | land | | | | | | | | | | | | | | | |
| 17. | | | Emna | - | - | - | - | - | - | 1" | - | - | - | - | - | - | 5" | - |
| 18. | | | Neem | 1 | - | - | - | - | - | - | 3" | - | - | - | - | - | - | - |
| 19. | | | Runjha | 1 | 2 | 2 | - | 2 | 5 | 8 | 5 | 7 | 8 | - | 10 | 10 | 14 | - |
| 20. | | | Bans | 1 | - | - | - | - | - | - | 1 ½ | - | - | - | - | - | - | - |
| 21. | | | Kumta | - | 1 | - | - | - | - | - | - | 5" | - | - | - | - | - | - |
| 22. | 5 | level &stony | Runjha | - | 3 | 3 | 1 | 2 | 3 | 3 | - | 6" | 9" | 13" | 10" | 10" | 12" | |
| 23. | | | Bans | 1 | 1 | - | - | - | - | - | - | 1" | 3" | - | - | - | - | - |
| 24. | | | Neem | 1 | 1 | - | - | - | - | - | ½" | 3" | - | - | - | - | - | - |
| 25. | | | Anwal | 1 | - | - | - | - | - | - | 6" | - | - | - | - | - | - | - |
| 26. | | | Ber | - | 2 | - | - | - | - | - | 5" | - | - | - | - | - | - | - |
| 27. | 6 | stream | Desi Babul | - | 1 | 3 | - | - | - | 4 | - | 6" | 6" | - | - | - | 13" | - |
| 28. | | | Bans | 3 | - | - | - | 1 | - | 6 | 3 | - | - | - | - | 4" | 4" | - |
| 29. | | | Khajur | - | - | - | - | 3 | - | 3 | - | - | - | - | 24" | - | 24" | |
| 30. | | | Jamun | 1 | 1 | 1 | - | - | - | - | - | 7" | 8" | 2" | - | - | - | - |
| 31. | | | Neem | 1 | - | - | - | - | - | - | 5" | - | - | - | - | - | - | - |
| 32. | | | Runjha | - | 1 | 1 | - | - | - | 3 | - | - | 7" | 5" | - | - | 8" | - |
| 33. | | | Emna | - | 7 | - | - | - | - | - | - | 6" | - | - | - | - | - | - |
| 34. | | | Anwal | - | 7 | - | - | - | - | - | - | 6" | - | - | - | - | - | - |
| 35. | | | Kumta | - | - | - | - | - | - | 1 | - | - | - | - | - | - | 8" | - |
| 36. | 7 | hill plain | Kumta | - | 2 | 5 | - | - | - | - | - | 5" | 6" | - | - | - | - | - |
| 37. | | Dhola | Emna | - | 1 | 1 | - | - | - | - | - | 5" | - | 8" | - | - | - | - |
| 38. | | Magra | Gukar | 2 | 1 | 1 | - | - | - | - | - | 3" | 4" | 6" | - | - | - | - |
| 39. | | | Ber | - | 4 | - | - | - | - | - | - | 5" | - | - | - | - | - | - |
| 40. | 8 | slopy plain | Neem | 2 | 1 | 3 | - | - | - | - | 3" | 3" | 4" | - | - | - | - | - |
| 41. | | | Tabola | - | 1 | - | - | - | - | - | - | 5" | - | - | - | - | - | - |
| 42. | | | Anwala | 2 | 5 | 1 | 2 | - | - | 12" | 3" | 5" | 5" | 5" | - | - | 6" | - |
| 43. | | | Kanji | 1 | - | - | 1 | - | - | - | 4" | - | - | 9" | - | - | - | - |
| 44. | | | Emna | 1 | 2 | 2 | - | - | - | - | 8" | 7" | 1- | - | - | - | - | - |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | " | | | | |
| 45. | | | Kumta | 1 | 3 | 1 | 4 | 1 | 3 | 5 | 5 | 7 | 6 | 7 | 9 | 8 | 8 | - |
| 46. | | | Ber | 1 | 3 | - | - | - | - | - | 8 | 8 | - | - | - | - | - | - |
| 47. | | | Godal | 1 | - | - | - | - | - | - | 5" | - | - | - | - | - | - | - |
| 48. | | | Renjda | - | - | - | - | - | - | 1 | - | - | - | - | - | - | 14" | - |
| 49. | | | Ukileptis | - | 1 | - | - | - | - | 1 | - | 3" | - | - | - | - | - | - |
| 50. | | | Kher | - | - | - | 1 | - | - | - | - | - | - | 6" | - | - | - | - |
| 51. | | | Anwal | - | 1 | - | - | - | - | - | - | 5" | - | - | - | - | - | - |
| 52. | | | Runjha | - | 1 | - | - | - | - | - | - | 3" | - | - | - | - | - | - |
| 53. | | | Desi Babul | - | - | - | - | - | - | 1 | - | - | - | - | - | - | 15" | - |
| 54. | 9 | stream bed | Ber | 1 | 1 | - | - | - | - | - | 4" | 8" | - | - | - | - | - | - |
| 55. | | Bor ka vela | Emna | - | - | 2 | - | - | 1 | 1 | - | - | 8" | - | - | - | 8" | 9" |
| 56. | | | Dhak | - | 1 | - | - | - | - | 5 | 7 | - | 8" | - | - | - | 20" | - |
| 57. | | | Kumta | - | 5 | - | 1 | - | 4 | 4 | - | - | 7" | 8" | - | 10" | 10" | - |
| 58. | | | Neem | 1 | - | - | - | - | - | 2 | 3" | - | - | - | - | - | 9" | - |
| 59. | | | Runjha | - | - | - | - | - | 1 | 3 | - | - | - | - | - | 6" | 13" | - |
| 60. | | | Keekar | - | 1 | - | - | - | - | - | - | 24 " | - | - | - | - | - | - |
| 61. | 10 | hilly | Kumta | - | - | 6 | 1 | - | - | 1 | - | - | 7" | 6" | - | - | 13" | - |
| 62. | | | Rejda | 1 | - | - | - | - | - | - | 4" | - | - | - | - | - | - | - |
| 63. | | | Tabola | 2 | - | 1 | - | - | - | - | 5" | - | 7" | - | - | - | - | - |
| 64. | | | Neem | - | - | 1 | - | - | - | 1 | - | - | 6" | - | - | - | 7" | - |
| 65. | | | Runjha | - | 5" | - | - | - | 3 | 3 | - | 3 | - | - | - | 9" | 10" | - |
| 66. | | | Keekar | - | 1 | - | - | - | - | - | - | 5" | - | - | - | - | - | - |
| 67. | | | Halar | - | - | - | - | - | 1 | - | - | - | - | - | - | 8" | - | - |
| 68. | | | Ber | 1 | - | - | - | - | - | - | 7" | - | - | - | - | - | - | - |
| 69. | | | Emna | - | 1 | - | - | - | - | - | - | 7" | - | - | - | - | - | - |