Case Study on
Reclamation of Ravines through Endogenous Technology and In-situ Conservation of Local Biodiversity, and Strengthening Livelihood Security in Morena District

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1 Project Area – Ravines and their effect

1.1 Morena is one of the 50 districts of the state of Madhya Pradesh (MP) in India. This district is located in Chambal division of which Morena town is the Divisional headquarter.

1.2 The Chambal River originates in Sheohar district about 200 kms, from Morena and flows round the year. Iit is one of the cleanest, i.e most unpolluted rivers, as there are no industries on its bank. The river is inhabited by dolphins, crocodiles and a variety of aquatic creatures.

Deep gully formation for water flow

The river Chambal meanders leisurely through Morena district most of the year; but, during monsoons, along with its feeder streams, it carries huge loads of clay-laden storm water. This torrential flow creates the most striking land feature of the area - ravines - which are deep gullies, as deep as 80-90 feet in some places, cut by the water. Ravines are formed by deep erosive action of water on the alluvial soil However, "unlike ravines elsewhere in the country, those in Chambal Valley are massive—up to 10 metre deep and 30 metre high, and are spreading fast."[1] They reach out from the uplands/ hills to the lower reaches and nothing grows on them. Often as in the case of Morena, this process of ravine formation has been an on-going phenomenon due to continuous erosion.

The state of MP is estimated to have about 180,000 ha of ravines (Times of India, Jan. 15, 2015), out of a total area of 308,252 sq. km. or 30,825,200 ha. Morena district covers an area of 4,998.78 sq. km. (499,878 ha), of which 50% (249,939 ha) is under cultivation. The irrigated area (146,814ha) forms 58.74% of the cultivable area, with canal irrigation accounting for 42.94% (63,042 ha) of the total irrigated area. It has been estimated that

[1] Shreeshan Venkatesh. "At a blind bend." *Down to Earth,* 31 July 2016, http://www.downtoearth.org.in/news/at-a-blind-bend-54952

about 30,000 ha of this area, or approximately 50% of the canal-irrigated area of Morena district has been affected by ravines.

"Ravines in the Chambal are said to be hundreds of thousands years old. Their origin is traced to a geological process, the last thrusting event in the Himalayas. The other factor is that the alluvial soil in the valley is loose, has high sand content of up to 95 per cent and extremely low organic content. This makes it further prone to erosion. Preventing ravines from engulfing villages has been a long struggle of the people; the government in this area deployed even a unit of ex-army men to extend support to contain the spread of ravines. National Foundation of India site[2] reports that ravines have affected 948 villages in Bhind and Morena districts.

"Containing these massive ravines requires an intelligent approach practiced by communities which have reclaimed land along the Chambal and are benefitting from it. A community in Morena's Bhindwa villag, which understands that a ravine is the result of accelerated surface erosion. So they regulated the flow of water by building a 100 m-long concrete retention wall on a slope next to their farmland. The wall has a 13 m-wide conduit at the centre. As the rainwater flows through the conduit, its erosive force is reduced. The soil eroded gets deposited on the farm-side of the wall. The result was beyond imagina tion. In five years, gorges have filled up and hillocks have shrunk. The community has reclaimed 100 ha of fertile land, which has been distributed among 18 families which built the wall at an expense of Rs 1 million."[3]

The above fact is corroborated by the combined data for Morena and Sheopur, as well as Bhind districts, which show a continuous decline in the ravine area (See table reproduced from 'Down to Earth).

Table 1: Changes in ravine area (in ha)

Year	Morena/ Sheopur	Bhind
1943-44	138,000	93,000
1950-51	147,700	86,400
1975-76	191,300	119,400
2013	90,992	19,352

Source: Down to Earth[4]

The reduction, as reportedly observed in Environmental Earth Sciences paper is "more likely as one moves away from the Chambal; the ravines closer to its banks are expanding and becoming deeper."[5]

[2] http://nmap.nfi.org.in/article/feast-of-the-ravines/ accessed on 31st Aug 2017
[3] *Ref. 1 above*
[4] *ibid*
[5] *ibid*

Villages affected due to vast stretch of ravine formation

When ravines advance, they affect entire villages, initially segmenting them, and ultimately swallowing them, complete with their arable land, houses and even roads; as a result, the population is forced to migrate, leaving behind skeletal huts as only proof of villages that existed. The poor and the *dalit* are often the least prepared and equipped to move to other locations.

India Today[6] reports an estimated 2,500 acres of land go to waste every year. Local NGOs in Morena report there is a total 35,000 hectare of ravine land known as *Beehad* in Chambal area.

As a consequence, the area suffers from:

(i) Continuous decline in cultivable land and its impact on subsistence of those living at margins;

(ii) Continuous loss of dwelling places and forced migration in search of food and shelter;

(iii) Continuous loss of biodiversity and increase of unusable land for crop production in an area of adequate water resources;

(iv) Continuous increase of land unsuitable for any other purpose, including industrial development.

2 Social Groups, Tensions and Culture in the Project Area

2.1 The population in the area comprises Scheduled Castes (SC), Scheduled Tribes and other Backward Classes. The weakest sections among SC and ST communities are from Harijan, Malhar, Bhogia, Lala, Badele, Kumhaar, Kadere, Sheria and Bhil castes. They had no assured and

Piprai Pura village community interacting with DMI team

[6] http://indiatoday.intoday.in/story/the-relentless-march-of-the-ravines-in-madhya-pradesh/1/409842.html accessed on 31st Aug 2017

sustainable sources of livelihood. The economic differences among the different sections were sharp. Till as late as a decade ago, many were denied their voting rights, women were confined to domestic work and girls were not allowed to go to schools by the influential and dominant sections in the area. The SC and ST were compelled to work for dominant castes.

2.2 Gujjars are the dominant caste in this region though they are also classified as Other Backward Caste by the Madhya Pradesh government. The primary source of livelihood for the male members of Gujjars was dacoity and theft of food grain from railway wagons, as they did not own any cultivable land. The stolen food grains were then sold in the market to earn their living. There was hardly any land for cultivation, as the land had been engulfed by the Chambal and denuded to uncultivable ravine.

2.3 Around 2007[7] when the last major group was eliminated, dacoity was no more an issue; but the area continues to be plagued by its gun culture. During interactions, the community members recalled that about 8-10 years ago, a major clash which erupted between communities during election forced the Morena District Superintendent of Police (SP) and Collector to intervene and douse the tension. As an additional benefit, visits by district administration and police brought the poorer community in contact with the administration, and the poor got a reprieve and much-needed protection and encouragement to cast their vote freely.

2.4 There have also been certain desirable outcomes of the migrations which followed the engulfing of land by the streams and formation of ravines. When the community of Piparai Pura got relocated to Malpur following ravines engulfing their land, the members got exposed to local leaders and residents who could engage in different livelihood activities of their choices and cast their votes. Similarly, when girls and women got exposed to other visitors in their village and observed them attending a few meetings at Malpur, some got motivated to send their daughters to school. Gradually the village community got exposed and sensitised to assert their voting rights and send their children to schools. Women too got mobile and vocal. However this social transformation process was gradual and the UNDP's

Village community interacting with DMI's documentation team

[7] https://www.telegraphindia.com/1130407/jsp/7days/story_16756788.jsp accessed on 1st Sept. 2017

SGP project helped to accelerate the pace of empowerment.

2.5 Prior to this project intervention, more than two thirds of the existing land in these villages was amenable to neither irrigation nor cultivation. Most of it was uncultivable ravine. About 400 landless families are direct beneficiaries of Guggul conservation and plantation programme launched by the NGO, Sujagriti Samaj Seva Sansthan (SSSS); the intervention has enhanced their income. This includes 100 families from adjoining Naduapura and Jaitpur villages dependent on Guggul gum production for their livelihood. Households with some cultivable land could grow only Bajra during Kharif season, followed by cereals like Jowar and pulses like Mung and Urad. Mustard is the main crop in Rabi season followed by gram.

3 Sujagriti Samaj Seva Sansthan (SSSS)

3.1 In Morena, Sujagriti Seva Sanstha, a non-profit organization, is trying to address the issues of loss of land and livelihoods to ravines through a multi-pronged approach, comprising:

(i) Improvement of soil strength by re-introducing the thorny shrub, guggul (Commiphora wightii);

(ii) Construction of Dorbandi and Check dams resulting in conservation of land from ravine formation and increase in recharge of wells with attendant augmentation of agricultural production and effective management of water resource.

The above two measures automatically contribute to the conservation of biodiversity and enhancement of livelihoods.

3.2 Sujagriti Seva Sanstha was founded by Zakhir Hussain who, on completion of his BA degree in Social Sciences in 1988, took to farming as an occupation following his love for environment. In mid-1990's, he joined Samarthan in Bhopal, M.P. Samarthan, a Centre for Development Support, is a leading non-profit organisation working in the states of Madhya Pradesh and Chhattisgarh since 1995. Around this period, the message of constitutional amendments empowering Panchayati Raj Institutions (PRI) and Urban Local Bodies (ULB) was under active discussion by development organisations. Mr. Hussain worked with Sarmarthan to prepare Panchayats to effectively fulfil their mandate of 'economic development and social justice' in their respective areas. His role in Samarthan demanded capacity-building of PRIs and ULBs. Samarthan designed training programmes and reached out to PRIs and ULBs through a large network of voluntary organisations. It also motivated teams to go down to grassroots and provide handholding support to the women, SC and ST representatives elected on reserved seats in large numbers. Voter Awareness campaigns, Gram Sabha mobilisation, Participatory village planning and Right to Information campaigns were

some large-scale capacity building initiatives. Mr. Zakhir Hussain whole-heartedly worked on these initiatives.

3.3 His work at Samarthan prompted him to set up his own NGO that would look into the empowerment of women and better implementation of Panchayati Rat initiatives. Sujagriti Samaj Seva Sansthan (SSSS) got registered in Morena on January 7, 1999 with the vision and mission of Mahila Shashaktikaran and Implementation of Panchayati Raj. The NGO did very well in empowering the local women and providing justice to the marginalised. Its focus is on Natural Resources Management, conservation of biodiversity, promotion of eco-friendly agriculture techniques, procurement and collection of non-timber forest produce (NTFP). It works with women and youth in particular.

3.4 However, in 2001-02, Zakir Hussain found something still missing and wanted to work in the area of Biodiversity. Shyam Bore who used to come down from Samarthan to Morena for training in different areas, introduced biodiversity to SSSS. In the year 2004, the state of MP came out with the Madhya Pradesh Biological Diversity Rules, 2004, under which Madhya Pradesh State Biodiversity Board came into existence. Shyam Bore identified a few volunteers who could take the cause forward and trained them in the roots and functions of biodiversity.

3.5 B.M.S Rathore, an Indian Forest Services officer and Member-Secretary of the Madhya Pradesh Biodiversity Board encouraged Zakir Hussain to get involved in the conservation of Guggul in Morena district. Rathore deputed Dharamvir Rai to meet Hussain and provide necessary support and direction, and introduced Sujagriti to Centre for Environment Education (CEE). He urged SSSS to submit a proposal to CEE for funding. Under his guidance, SSSS also worked on creating the People's Biodiversity Register (PBR) in an eight-day workshop. Later Mr Prabhjot Singh Sodhi (the National Coordinator, GEF UNDP SGP India Programme) visited. For two full days, he travelled extensively with Mr. Hussain in the ravine areas to understand the issues.

3.6 Today, Mr. Zakhir is proud of the strong network SSSS has developed among more than 30 villages. He says, "We are in continuous search for those who love their soil, those who are sensitive to environment and environmental issues." He adds, "The farmer who toils on his land from dawn to dusk is more solicitous to its existence and its possible loss than any volunteer who works in the organisation."

3.7 SSSS works predominantly in the following seven villages:

Table II: Villages under the Coverage of SSSS

Sl. No.	Village	Number of Households (HH) associated with SSSS
1	Piprai	250
2	Piprai Pura	260
3	Bhanpur	208
4	Jetpur	35
5	Bhindwa	80
6	Masoodpur	215
7	Naduapura	40
	Total	**1,088**

3.8 As stated at the beginning of this section, SSSS is engaged in the promotion of the following three major groups of activities:

(i) Conservation of bio-diversity and promotion of livelihoods among the ex-dacoits of the area by mobilising them and motivating them to engage in cultivation and conservation of medicinal plants in the ravines, and sell them to major ayurvedic firms;

(ii) Prevention of formation of further ravines in the area covered by the seven villages by helping the villagers construct comparatively robust retention walls and conduits that promote effective soil and water conservation; and

(iii) Promotion of livestock farming, including dairying.

4 Interventions of Sujagriti Samaj Seva Sansthan (SSSS) in Morena District

4.1 *Improvement of soil strength by re-introducing Guggul (Commiphora wightii)*

4.1.1 The plant, known for the medicinal use of its resin, was once endemic to the valley. Guggul (Commiphora wighti) is an important arid medicinal plant species found in Rajasthan, Gujarat and Madhya Pradesh. (See Exhibit 1 for more details.) The oleo-resin of Guggul plants has wide application in the treatment of numerous physical disorders and diseases like inflammation, obesity, cardiovascular disease, fracture of bones and lipid disorders. It is a slow-growing plant that forms an important component of the floral diversity in the arid and semi-arid regions, as it binds soil prone to erosion. Thus the plantation and conservation of Guggul protect the ravines from expanding further, while simultaneously improving livelihood opportunities for the local population.

4.1.2 The total demand for Guggul resin in India is estimated at 1,610 tonnes, but only 10 tonnes of Guggul are extracted at present. The huge gap between demand and supply provides an excellent opportunity to increase the income of people in Morena and other similar areas of MP and the rest of India by engaging themselves in the plantation of Guggul and tapping of resin.

4.1.3 It takes three to four years for the plant to take root and start yielding the resin. The project begun in 2006 by SSSS has now seen guggul plants take roots across 100 ha of community land. SSSS is also working on the conservation of Guggul plants in 2,000 hectares of ravines covering 15 villages.

4.1.4 The following reasons are attributed for the decline in the population of Guggul plants in the region:

- Destructive tapping: Tapping of Guggul plants has been a traditional livelihood activity. It is carried out with the help of a local knife and use of Guggul solution as an activator. The main branch of the plant was tapped for better produce. With the increase in demand of Guggul gum, chemical activators were introduced in tapping, to increase the extraction of Guggul gum from plants. This tapping practices destroys the plant and it dries.
- Termite infestation and Jararu Disease: The soil in the ravines is loose and light. Termite infestations in almost all the plants are common in the area. Guggul plants, being comparatively fleshy, are susceptible to termite infestation. Termites eat away the plant from the base causing the plant to fall down and dry.
- Soil erosion is also one more reason of decline of the Guggul plants as the roots leave the soil resulting in falling and drying of the plants.
- Guggul plants are further destroyed by encroachment and clearing of area for cultivation. The process becomes more acute as advancing ravines swallow earlier lands.
- Guggul trees are chopped for fuel wood.

SSSS addresses these issues by continuous education of the village residents involved in tapping of the resin.

4.1.5 The process followed by SSSS has been arduous and time-consuming. Following the approval of the SGP-GEF project, several rounds of consultation were held with the local community in the villages. However, the community was not interested, and no one was willing to get involved. The villager residents were hesitant and rejected anything to do with Guggul conservation and arrest of soil erosion. Even after some Guggul plantation was carried out by the project personnel of SSSS, the village residents were not willing to nurture the plants by watering, protecting or spraying medicines. They perhaps feared that the steps would compromise their right to collect and sell Guggul; or the intermediaries involved in the collection of the resin were advising them to stay away. In spite of such indifferent and cold response by the community, a series of sensitisation and awareness programmes were planned. Cultural plays and songs were organised in the villages on the issue of protection and reclamation of ravine ingress by Guggul conservation. Later, two short documentary films were also presented to the community - one made by Sujagriti on Guggul conservation, organic farming, and functions performed by Bio-diversity Management Committee, and the other by CEE on reclamation of ravines in Morena district. SSSS also persuaded people to take care of the plant by explaining its economic value and by training them in tapping the raisin. Gradually, the community started showing some interest, and with its participation, Guggul and other project activities were initiated. The establishment of Bio-diversity Management Committees (BMC's) also helped build capacity of the local community and user groups.

4.2 Planting and Protection of other species of medicinal plants

4.2.1 In addition to Guggul, SSSS also promotes the cultivation and sale of root of another valuable medicinal plant, viz. sattavar. The process for this plant is not different from the one adopted for Guggul.

4.3 Water Conservation and Erosion Control Structures

4.3.1 A second major intervention of SSSS is to help people construct Dorbandi and Check dams. This intervention has resulted in conservation of 700 hectares of land from ravine formation, and increase in recharge of wells and greater agricultural production. Water level rose up by 13 to 15 feet in the project villages following the construction of around 9,000 mts. of Doorbandi. (See Exhibit II for details.) The details of Dorbandi, Stopdams, Jalnikasnalis and Check dams facilitated by SSSS are as follows:

Table III: Details of Dorbandi, Stopdams, Jalnikasnalis and Check dams

Village	Protective Wall/ Dorbandi (meters)	Stopdams (number)	Jalnikasnalis (number)	Checkdams (number)	Families Benefitted from Water Management Measures (Number)	Families engaged in Guggul Production (Number)
Piprai	1,500	1	7	1	25	
Bhindwa	3,000	1	5	-		5
Masudpur	1,200	-	5	-		30
Pipraipura	1,200	-	7	-		12
Bhanpur	G.P[8]	-	4	-		25
Jaitupur	250	-	-	-		15
Naduapura	500	-	2	-		All
Holaprad	625	-	-	-		1,000 Plantations, 7 families
Jarah	G.P	-	-	-		200

5 Business Model of SSSS

5.1 Sujagriti Samaj Seva Sansthan implemented the initiative to check soil erosion and enhance local livelihood in 2007, with support of the India Program of GEF-UNDP SGP. The objectives of the project were as follows:

- Reclamation of land lost to ravines by growing Guggul plants in seven villages of Morena district;
- Prevention of erosion and protection of land through soil and water preservation approaches;
- Conservation of local traditional Guggul seed and other plant varieties; and
- Enhancement of income to local community through biodiversity-based livelihood options.

5.2 The NGO is committed to the above causes and works relentlessly with communities which have been traditionally ravaged by natural calamities and have practised dacoity and oppression as the means for living. The NGO was formed in the year 1999 out of the promoter's passion for conservation of biodiversity. However, the project became operational only in 2007. As a person with limited educational and organisational exposure, but with a very high level of passion and commitment, the promoter has successfully emulated the good practices of many small development organisations.

5.3 The NGO is a facilitator for all interventions, but does not get directly involved in business activities. It has successfully mobilised communities which any organisation is bound to find it difficult to deal with, and has spurred them into self-supporting

[8] Guggul plantation -1000 plants

economic activities. The institution receives its grants from SGP and a few other sources, and uses them mostly for community mobilisation and organisational expenses, and for supplementing community contribution to water conservation and erosion control structures (like Dorbandi, Stopdams, Jalnikasnalis and Check dams).

5.4 As far as the production and sale of Guggul are concerned, the role of SSSS is limited to motivating the families to plant, nurture and tap the trees when they are ready, and sell the resin. The NGO does not play any direct role in the procurement or sale of the gum/ resin by organising the producers. Before the project, villagers sold Guggul gum to local traders who, in turn, sold to pharmaceutical firms. The Government of MP has opened two Guggul collection centres in the area to facilitate procurement and sale of produce directly and to eliminate intermediaries. The minimum support price has also been enhanced from Rs. 450 to Rs. 900 per kg by the forest department. The Guggul gum is collected twice a year in these two collection centres – once during Diwali and again Holi festival. The community members, however, hesitate to sell to State-run facilities due to fear of interrogation in regard to reasons for harvest/ excessive harvest.

5.5 If properly conserved, regenerated and harvested from plantation, Guggul has the potential to engage 1,000 villagers in the area who can produce 35,000 to 40,000 kg. of Guggul gum, as against 300 kg. being currently produced. Other than Guggul gum, villagers also sell Guggul seeds for Rs 5,000 per kg, and Guggul plants and stem cuttings. Some other forest produce like Satawar and Kareel pickle are also collected at the same time and sold.

5.6 AS stated earlier, the project has potential to engage 1,000 producers for production and sale of about 35,000 to 40,000 kg. per annum. Valued at Rs. 900/- per kg., the potential income for the group of producers is about Rs. 31.50 million, or approximately Rs. 31,500/- per family at current rates fixed by the Govt. of MP. The income is likely to be higher if we factor in the market conditions, such as the gap between demand and supply, demand growth rate, new product development, etc. Further, with the potential additional income from Satawar, and sale of excess agricultural produce from land protected from erosion, there is a huge potential for economic upliftment of the rural populace of Morena district, while simultaneously conserving biodiversity.

5.7 SSSS does not appear to possess the required business development skills and needs to be sensitised and supported for this important and significant next step.

6 Governance and Management of SSSS

6.1 Society Members

6.1.1 The Society has nine members who constitute the general body, which reportedly meets once during the Annual General Body meeting.

6.2 Board of Governors

The Managing Committee or Board comprises the following five persons:

- Mr Zakir Hussain, based in Morena, Managing Director, Chairman/ President
- Vinod Mishra, staying in Datiya, Social worker, (MA Music), Lyricist, Musician, Writer, Playwright etc.
- Brajesh Upadhyay, staying in Morena, farmer owning 20 Bigha agriculture land and operator of 8 busses, interested in social development and supports, if required
- Smt. Shamim Khan, staying in Morena, holds MA, LLB, a lawyer by profession, associated with Samarthan, Bhopal, engaged in women empowerment, Panchayati Raj, etc.
- Smt. Sheela Arya, staying in Gwalior, teacher and house wife

The Board members are promoters of the organisation and they meet once in 3 months.

6.3 Advisory Group

The Society has also constituted an Advisory panel of experts, comprising the following members:

- Dr. Arun Sharma
- Shri Moni Thomas
- Shri Brajesh Upadhyay
- Dr. Roza Oliyayi

6.4 Employees

The following five staff members are employed on monthly salary:

- Amil Khan, Project Coordinator, CEE Project
- Ms.Kiran Sharma, Project Coordinator, Biodiversity
- Rajendra Bandhil, Accounts and Office Administration
- Ms. Tahira, Reporting, MIS and Computer Operator
- Dev Singh, Office Peon

Mr. Hussain says the NGO has been fortunate to have a team of technical advisors from several institutions such as Agriculture University, JNKVV Jabalpur, JFMC, Panchayat, Forest Department, State Biodiversity Board (Bhopal), National Medicinal Plant Board (Delhi), etc., who are willing to provide technical support whenever required. There has been no wage work carried under MGNREGA programme; hence Mr. Hussain intends to link construction of protection walls, check-dams, drainage systems, Guggul conservation and plantation activity through the MGNREGA in all the

30 villages.

7 Source of Funds

7.1 The Society manages its operations out of the following sources of income:

- Service charge @ 2% of the sales value from sale of NTFP such Guggul gum, Satavar, Chameli, Aloe vera, Bamboo, Giloy etc., and value added packaged products such as Kareel pickle, incense sticks (Agarbattis), Cones, Cotton Phoolbatti;
- Donations from senior government employees and some funds under Corporate Social Responsibility (CSR);
- Funds under specific project implementation like SGP-GEF Small Grant (Rs. 2 million), MP SBB Forest Department, CEE on awareness of Guggul, etc.
- Regular contribution of Rs. 100 made by members, totalling Rs 24,000 per annum.

7.2 In addition, SSSS receives free technical and intellectual support from Agriculture University and Jawahar Lal Nehru University, Jablapur.

8 Project Impact and Challenges

8.1 Impact

- The project demonstrates the potential for multi-pronged interventions to contain the formation of ravines as well as their reclamation, by persistent involvement of community (See Exhibit III on the role of women's participation.) in soil and water conservation, and protection as well as promotion of biodiversity.

Joint effort by institutions, schools and community

- Due to the project effort on systematic Guggul conservation, plantation through nursery and seed development and education on sustainable harvest practices, the total yield of Guggul in Morena is expected to increase in the next 4-5 years.
- People have started realising income from activities that conserve and promote biodiversity.
- They are also socially better mainstreamed with the rest of society, having given up dacoity and finding meaning in productive work.

One of the school herbal gardens

- Reduction in vulnerability of the community to vagaries of nature has been realised through preservation of soil, and enhancement of yield from Guggul.
- Other adjoining villages have also realized the importance and got indirectly sensitized about need and methods of protection from ravine ingress. They also want their land to be saved from getting eroded. They see the correlation between intervention and potential for sustainable livelihood.
- This project makes a persuasive case for check dams being built to contain force of monsoonal run offs. If investments could be made through community participation to construct more check-dams, water bunds and small water structures, it can save additional 500-700 hectare land around Bhindwa village.
- Local knowledge and capacity for soil conservation to contain ravine have been developed through the project interventions.

8.2 Challenges and Opportunities

- Sujagriti reports state that under the SGP project, Guggul conservation and plantation was done in a total 35 (20+15) hectares till 2017. However, the affected area is huge – some 35,000 hectares - and the potential for expansion is immense. The following need to be considered to be able to assess potential for scaling up/ replication:
    - Cost per hectare whether in-situ conservation or ex-situ multiplication of seed stock and replanting, and caring of plants;
    - For new plantations, the plants need at least five years before they can begin yielding, adding to the cost of protection/ maintaining and posing challenge to holding community intervention.
    - For in-situ conservation in areas where Guggul plants population has been severely depleted, total cessation of collection of the gum is needed. This can impact livelihoods in an area where community is already at the brink due to severe land degradation.

  Hence multi-pronged initiatives that help to augment livelihoods have to be carefully crafted with community support.

- Government has opened two centres for Guggul procurement but the community's faith is low and they do not avail of its services. This distrust needs to be addressed to reduce involvement of intermediaries. Otherwise, the gains of the project are likely to be frittered away.
- The immense potential in the area can be realised meaningfully through collectivisation of producers. While several organisational models are available, SSSS has to play a catalytic role to create and nurture the organisation till it matures and is independent of any external support.
- The constant march of the ravines does not allow the luxury of resting at any point of time. The Hindu[9] states that by "conservative estimates, the ravines here are spreading at a rate of 2.20 hectares a day" in Madhya Pradesh, Rajasthan and Uttar Pradesh. Several types of initiatives have been mooted – flattening the ravines with bulldozer, spraying the area with thorny acacia to hold the soil, etc. to reduce the constant degradation of flat land into ravines. Madhya Pradesh alone as per this news report has 3.11 *lakh* hectares of ravines. So, the scale of work is large. Further, there is need to ensure that the reclaimed land does not fall prey to depredation of ravines in monsoons.
- Guggul conservation poses special problem as it yields twice a year and several parts like stem and seeds have economic value in addition to the sap. Hence the plants are under threat of over exploitation all the year round.
- The terrain is such that monitoring in-situ conservation of Morena variant of Guggul poses special problems of commuting to sites where it survives.

9. Future Plans

Sujagariti plans to expand and cover additional 30 villages in the next 2-3 years with the objective of enhancing the economy and wellbeing of the community through Guggul seed collections, setting up nurseries, plantation and conservation of Guggul programme, construction of protection walls, improving drainage systems and check dams. The organisation is hopeful that in the next three years or so, there will be a positive impact in the area. According to Mr. Hussain, President, SSSS, his organisation may not have a strong human resource team but he is satisfied with the quality of field-based network and local volunteers' involvement, particularly the BMCs recognised under Madhya Pradesh

Support of BMC has been critical for project interventions

[9] http://www.thehindu.com/2001/06/17/stories/1417212b.htm accessed on 31st Aug 2017

Panchayati Raj system established under the project initiative. BMC has the authority to manage, monitor, collect tax, share resources and earn revenue.

Guggul and its Economic Relevance

Wild Guggul plants are facing severe extinction pressure

Commiphora genus is found in Gujarat, Madhya Pradesh and Rajasthan in India, parts of Pakistan, and in Arabia (Gileadensis species which yields Balsam of Mecca) and parts of Africa like Namibia. This plant is source of fragrant myrrh having Biblical references even and used extensively in traditional Indian medicine system of Ayurveda.

The species *Commiphora wightii* also called *Commiphora mukul* species is restricted to western India and adjoining regions of Pakistan. Overall the ravines are traditionally more depended on herding of small ruminant like sheep. The community reported to the DMI team that grazing animals do not feed on this plant. But IUCN holds continuing human induced environmental pressures (anthropogenic) like grazing and browsing by domesticated animals is adding to its decimation. In fact the Indian genus is on the IUCN's[10] Red List[11] of threatened species i.e. facing severe extinction pressures and it reports that government of India has banned its exports. Villagers in Morena report states like Rajasthan in India have its tapping illegal in a bid to conserve the wild stands of the plant. The wild plant population has suffered a 80 percent decline due to over-harvest and habitat loss including due to ravine formation.

Huge gap between demand and supply of Guggul gum

Since ancient times, Guggul is known for its gum and high value added products grows reasonably slow. Unsustainable and excess tapping has been the key reason behind Guggul species becoming extinct in Morena. It can be extracted once the plant is matured i.e. 5-7 years of age.

[10] http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T31231A50131117.en accessed on 31st Aug 2017
[11] http://www.iucnredlist.org/about/introduction accessed on 31st Aug 2017

Traditionally there is almost zero investment in Guggul plantation by a farmer. Animals do not feed on Guggul plants and there is little need for protection. The resin is collected from available trees. Typically the trees are tapped for resin from November when small nicks made in the bark. After incision the plant takes about 15 days to secrete the gum and the yield is between 250 gm to 450 gm per plant. The peak collections are done from November to January and some collection again happens around May-June. From one full-grown Guggul plant, farmers told DMI team that in August 2017 they could easily earn a minimum of Rs 800 (Rs 400+Rs 400) in a year by harvesting two cycles at six months interval.

The soluble fraction obtained on distillation is known as Gugulipid contains the bioactive components. The proportion of Guggulsterone (bioactive constituent) in Gugulipid is used as a standard for quality control[12].

It has extensive reference in Ayurveda texts. Indian Ayurvedic industry is a large consumer of this plant for Guggul medicine. Through clinical trials the west also has extensively studied this and there are formal medical publications on its efficacy in reducing bad cholesterol levels, pain, in constipation etc. (See endnote for a list of references on formal publications). While benefits in lowering cholesterol remain contested following medical trials, its efficacy in many other points is affirmed.

There is a huge gap between the demand and supply of Guggul gum. The current demand of Guggul resin in India is 1600 tonnes but Morena is able to barely produce between 05-08 tonnes annually. In India the annual production of Guggul has gradually come down from 500 tonnes (1960) to 05 tonnes. About 95 percent (500-600 tonnes) India's need for Guggul gum is met by importing from Sindh in Pakistan. The reason behind less production of Guggul gum in Morena is unsustainable practices, which has brought the plant close to extinction. The Morena Guggul resin is known as one of the best varieties. Guggul traders from Rajasthan (tapping is banned in Rajasthan since 1990) frequent Morena district and prompt traditional gum collectors to tap more and earn more.

Interaction at Piprai and Piprai Pura with the village community

Two project villages Piprai and Piprai Pura were visited in course of this documentation. Together Piprai and Piprai Pura villages (in Porsa Tehsil in Morena District of Madhya Pradesh, India), have a population of a little less than 5000. Piprai has 250 houses with a population of around 2600 and Piprai Pura village with 260 houses has a population of 1900.

[12] http://onlinelibrary.wiley.com/doi/10.1111/j.1527-3466.2007.00023.x/full

Piprai Pura village has 200 houses of *Jatav* (a Scheduled Caste) who constitute the majority followed by 10 house of the socially dominant *Gurjjars, Prajapati* 20, Muslim 20 households, *Koli* 20, *Kadere* (mattress- *Razai* makers) 07 and *Dhobi* 05 houses.

Piprai Pura villagers sharing their experiences

In Piprai and Piprai Pura village, 200 families are landless and dependent on production of gum from Guggul and Satawar. 25 landless families in Piprai Pura village (10 *Jatav* and 15 other of SC community) are engaged in Guggul based livelihood.

Project Interventions centred on Gugglu plantation and conservation

(a) Bio-diversity Management Committees (BMCs) have been formed in all the seven project villages to spearhead the interventions. According to the Chairman of Sujagriti, BMCs are recognised under Madhya Pradesh Panchayati Raj system established under the project initiative. Each BMC has 07 village representatives with 33 percent women candidates. BMC has the authority to collect tax, share recourses and earn revenue.

(b) Three Guggul nurseries (herbal gardens) have been established under the project as sites for Ex situ regeneration of the Guggul plant. About Rs 5 lakh was invested by the project to establish three nurseries and form nursery groups (herbal gardens) in 25 schools with an objective to protect the variety of local plant species including Guggul along with similar species like Satawar, Kareel, Chameni. It also created awareness amongst school children and in general. It was shared by the project-implementing organisation that about one quintal of Guggul seeds was sourced for these nurseries.

Satawar another local plant species

(c) 15,000 natural occurring Guggul plants in 70 hectare of ravines have been conserved in-situ

(d) In addition 35-hectare area was systematically planted with 10,000 Guggul plants.

(e) The villagers have divided the available plantation area according to geographical locations. Each is responsible for plantation, care and harvest. Any conflicts are resolved by respective BMC.

Tagged Guggul planted by village community as project initiative

Innovations in Guggul Plantation

Nearly 90 percent (about 10,000 + 20,000) of the plantation of Guggul by the village community consisted of saplings developed in the nurseries. A further 10 percent of the plantations were Guggul stems cuttings (*Kalam*).

Local experiences suggest plantation from Guggul stems was not successful. After two years of growth the stem requires continued watering during summer as compared to nursery grown saplings which requires water only once during summer. The community shared if the plant does not get water during summer, it gets infected by a 'insect web-cast' locally known as *Jararu*. Termite infection is also common due to loose and light ravine soil. The termites eat away the plant from the base causing the plant to fall down and dry. Hence in the first year of plantation Guggul plants, soil was chemically treated to protect from termite infection.

Intervention centred on improved tapping

Tapping technique is key to sustainable harvesting of Guggul. Villagers need to be careful during the tapping process of the Guggul resin. The thickness of the Guggul bark is between 1.8 to 2.0 mm and any incision on the bark to tap resin that beyond 2 mm thick damages the plant.

A new tapping device developed by Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur was introduced. The device has a sharp rolling blade of 1 mm width, which travels 2 mm deep into the bark but does not damage the bark.

Intervention in Marketing

The villagers are hesitant to sell their produce directly to the collection centres set up by the

government fearing questioning by forest staff on the source of collection and correlation with extent of degrading etc. Hence community sell the Guggul gum for Rs 150-200 per kg to intermediates earning about Rs 3000 to 4000 annually. The local community sells the Guggul gum on orders and the NGO helps to mediate and charges 2 percent mark-up on the total sale value. So far they have supplied 20 kg to Dabur, 60 kg to JNKVV Jabalpur University and about 50 kg to Radha Soami Dayal Bagh.

Village Bhindwa, Panchayat Masoodpur

The DMI study team visited Bhindwa village one of the seven project beneficiary village to interact with the community on the impact of construction of check-dam and water drainage systems. The village has about 80 houses with an approximate population of 900 comprising of *Gurjar* (OBC), *Jatav* (SC) and *Khatik* (SC) community. Majority of households are joint family each consisting of 40-60 members.

Bhindwa village community interacting with DMI team

Few village elders among the village community while interacting shared the ravines started appearing around 1950 in the form of small cuts on their farmland. Since last 60-70 years most of the land around the villages in Morena district turned into unusually deep pits and ravines gobbling up villages and wasting land. There has been continuous large-scale displacement in several villages. Not only ravines and soil erosion affected livelihood of villagers but over the years the land holding ownership of ancestral land also got fragmented among joint family members. As Bhindwa village was also affected by the ravines, the Scheduled Caste community had to migrate elsewhere in search of livelihood.

Water drainage system (Jal Nikasnali)

A check dam and water drainage system (*Jal Nikasnali*) was constructed in this village as part of the project intervention with active involvement of the village community. The villagers consisting of five *Gurjjar* (OBC) and rest are *Jatav* and *Khatik* (SC) have benefited from the project. Of the total construction cost, 25 percent was funded by community contribution in form kind and labour *(shram dan*). During construction stage, villagers arranged for transportation and provision of sand and water. Initially they also surveyed the location to select site for construction and post construction participated in monitoring and

management of the resources. Remaining 75 percent of the construction cost included expense on cement and wages to the mason was met by the project budget.

Management of protection mud walls-bunds (Dorbandi)

Water drainage system to drain rain water and reduce erosive force

The water drainage system consists of a 100-meter long concrete retention wall on a slope next to their agriculture land, which has helped to reclaim 100 hectares of fertile land of the village. The wall has a 13-meter wide conduit at the centre to drain the rainwater as a result it reduces the erosive force. The soil eroded gets deposited on the agriculture landside of the wall.

The community shared about management of protection mud walls-bunds locally referred as (*Dorbandi*) which is a 6 feet wide, 3 feet high and tapered to one feet width on the top. The protection wall of these bunds constructed about a year back has some issue. The mud wall is gradually eroding after a year. The villagers shared either it should have been constructed using stone boulders mixing with mud or it now requires some repair work by the community to continue the benefits.

Dheer Singh and his associate sharing how check-dam and water drainage systems has saved their life

The response of Bhindwa village community on check-dam and the drainage system has been over whelming. Dheer Singh a village elder aged about 90+ years emphatically shared, '*Apni to jaan bachh gayi*'. The check-dam and *Jal Nikasnali* have saved their life by restoring their 250-300 bigha (100 hectare) agriculture land from soil erosion '*katav*' and formation of ravines. The villagers shared earlier they were engage in

dacoity and theft related activities but now they are actively engaged with agriculture and livestock rearing.

Impact of Check dam on Livelihood

The agriculture land has been saved from regular soil erosion and ravine formation due to construction of check dam and drainage systems, which led to saving a population of 650. This has provided village the means of their daily basic needs. Soil and water could be conserved and ground water is recharged which helped to increase their agricultural productivity, household food security and annual income.

Concrete retention wall on a slope next to agriculture land

It was shared by community that earlier before the construction of check dam and the drainage systems their land was dry not suitable for ploughing and cultivation. The total agriculture produce was limited between 4-8 quintals annually. Villagers had to purchase food grains from the market for most of the year. Today the production of Wheat and *Bajra* has increased which suffices the household requirement across the year. They are able to sell surplus Mustard seeds, which was once purchased from the market. Villagers don't have to purchase any food grain from the market. There has been an increase of household's average annual income to Rs 1 lakh, which is approximate between Rs 3000 to Rs 4000 per family.

Improvement in agriculture productivity has also led to availability of sufficient fodder crops for cattle which is a supplementing family nutritional needs and income. The village has about 350-400 buffalos and at a time about 150-200 animals are milkable. Total milk production in the village is 1500-2000 litres and some families also sell milk locally between Rs 27-30 a litre.

Bhindwa village elders showing improvement in agriculture productivity and availability of fodder

Construction of check dams and water drainage systems in the village has led to increase in community income. They are able to earn additional income to satisfy their basic needs directly from agricultural fields and livestock. The project has achieved the target of construction of 2500-meter check dam and 4000 meters of water drainage and bunds *(Dorbandi)* in seven target villages due to involvement of the community. Both the check-dam and water drainage

system has led to a positive impact in the area. The efforts have demonstrated enhancement of economic returns by process of reclamation and protection of land from erosion through range of approaches, water prevention methods and community resource management. 2500 meters long protection wall (*Dorbandi)* was constructed with support of the project but about 9000 meters was made by community initiatives. Hence the community participation approach has greatly helped villagers to take their own efforts to save their own land from ravine formation.

Women's Participation

Interaction with Sant Ravidas SHG

In order to bring community ownership in the SGP GEF focus area and to link them with Guggul based livelihood total 10 Self Help Groups (SHGs) had to be formed. The NGO project report mentions about nine SHGs. One of the SHG – Jagriti is involved with collection, storage, production, packaging, and selling of Guggul gum, Kareel pickle, Satavar, Agarbattis, Cones, Cotton, Phoolbatti etc. The report states the SHG women members were strengthened and were involved with Guggul nursery groups.

Sant Ravidas SHG members with DMI team

However interaction with one of the SHG - Sant Ravidas in village Piprai Pura village revealed something else. The members shared there are five functional SHGs and not nine as mentioned in the project report. Initially total six SHGs were co-opted for the SGP project between 2013-14 in four villages. Ekta SHG was recognised in June 2014 in Gadora (Panchayat Bhanpur), Ambedkar SHG in June 2013 in Bhindwa village, two SHGs in village Piparai - Kashi Baba and Baldau SHG in February 2013 and two SHGs (Sant Ravidas and Sant Nirankari) were co-opted in Piparai Pura village in April 2013. Sant Nirankari members got dismantled in last six months hence presently there are 05 SHGs. Ideally perhaps visiting and interacting with Jagriti SHG member would have been more prudent- as the project report mentions about the group developing local products.

However members of Sant Ravidas SHG of Piprai Pura village were met. It was formed in 2006 with 10 members initially. In 2011, Sant Ravidas SHG opened its savings bank account to receive funds to manage school mid-day meals. The monthly MDM amount got transferred into SHG bank account as per the fund allocated to cook meals for school students by district education department. Hence it was not formed in 2013 as mentioned in the project report the SHG, has been active since 2006 or so.

As per records, each member of this SHG received Rs 10,000 as revolving fund in 2010 from District Zila *Panchayat*. In 2011-12 members also received Rs 20,000 as loan for purchasing buffalo. One member expired in 2013 and the second member has retired (unwell and old) except these two members remaining eight members said they have repaid the full loan amount. Presently there are 07 active members and they conduct monthly meetings. Names of SHG members as per register records: Guddi (president), Sunita (secretary), Rampriyari, Bejainti, Seema, Laxmi, Viro, Premvati, Gita, Ramdei, Mamta and Usha.

This SHG is not involved with any Guggul related IGP activity - either Guggul gum, Kareel pickle, Satavar etc. Their male members confided it is not safe to send women for Guggul extraction in the deep ravines and they are happier cooking MDM for local school.

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