

**Action Plan for
Development of Dirang Valley Watershed
Arunachal Pradesh**

**Sponsored by: North Eastern Development Finance
Corporation Ltd., Guwahati**

**Conducted by: National Institute of Rural Development,
Guwahati**

EXECUTIVE SUMMARY

TITLE OF THE STUDY PREPARATION OF ACTION PLAN FOR DEVELOPMENT OF DIRANG VALLEY, ARUNACHAL PRADESH

1. Introduction

The findings presented in this volume is the outcome of the research project sponsored by North Eastern Development Finance Corporation with the sole objective to prepare “**The Action Plan for the Development of Dirang Valley Watershed**”.

One of the main objectives of the Watershed Action Plan is to identify and prioritise problems specific to economic development and proposes actions necessary to address limiting factors deterring economic growth and welfare in the watershed area. The overall goal of the Action Plan is to enhance the economic health of the stakeholders of the watershed in a sustainable manner.

2. Methodology

Considering the background of the complex developmental mosaic in the watershed area, ***Participatory tools and method of Data collection*** were used in a phased manner to achieve the main objective of the Study

In the ***first phase*** fifteen sample villages having an average population size above fifty were identified and selected for collection of primary data from the farmers, headmen, entrepreneurs etc. For collecting information at the village level from the various stakeholders the following **Tools** were used

- Community Meetings
- Natural Group Interviews
- Focused Group Discussions
- Key Informant Interview

In the ***second phase***, selected government functionaries were interacted at the Block level in order to collect both primary as well as secondary data.

District level government functionaries were also interacted in the ***third phase*** in order to fully achieve the objectives outlined in the study.

In the second and the third phase of primary data collection from the various departments the following **tools** were used.

- Structured Questionnaire
- Group Discussion
- Personal Interview

Critical gaps in planning, execution and achievement in the previous programmes was identified. The information collection and particularly the resource use analysis and identification of development activities were completed through series of

meeting organized at the department level involving the officers and field functionaries in the process. The information gathered so have been analysed and presented in six chapters of the study.

3. Characteristic Features of the Study Area

- 3.1 Dirang valley watershed of Arunachal Pradesh is located in ***North Eastern part of West Kameng district***. The area is under the administrative jurisdiction of Dirang circle. Dirang valley is bounded by Tawang district of Arunachal Pradesh in the north, Bhutan in the west, Kalktang circle in the south and Nafra circle in the east.
- 3.2 Dirang watershed is situated in the foothills of Sela range. It consists of a series of mountains arranged in the form of some zigzag lines, criss-crossed by numerous streams and tributaries of Kameng river viz. Diranchu, Sangti, etc. The average altitude of the valley is in between 4500 ft to 5500 ft above the mean sea level
- 3.3 The Dirang valley watershed is situated in the temperate zone. Maximum temperature in the valley ranges from 12⁰C to 26⁰C while the minimum temperature ranges from 0⁰C to 15⁰C.
- 3.4 Based on agricultural practise, cropping pattern and altitude, the micro watershed has been divided broadly into three agro ***climatic zones*** namely, ***Low Altitude, Middle Altitude and High Altitude Zone*** containing 8, 39 and 21 villages respectively.
- 3.5 According to 2001 census, Dirang circle has a total population of 16,422 persons distributed in 68 villages. Out of this population 8525 are male and 7,917 are female.
- 3.6 63.53 percent of settlements (excluding hemlocks) are very small; each with a population of less than 200. There are as many as 32 small villages (47.45 percent) with population less than 100 person each.
- 3.7 The overall literacy in the Dirang watershed is 47.76 percent compared to 61.67 percent for the district and 54.74 percent for Arunachal Pradesh.
- 3.8 The population in the watershed namely Monpas are distributed among the 68 villages in the area. 53.34 per cent of the total households are located in the lower part of the zone while in the middle zone it is 27.34 percent and in the upper zone it is 19.32 percent.
- 3.9 The Monpas are Agriculturist. They practice both shifting and permanent types of cultivation.
- 3.10 ***81.31 percent of the total Monpa population in the watershed is below poverty line.*** 92.09 percent of the households in the middle zone are below poverty line where as the lower zone and upper zone accounts for 73.03 percent and 86.80 percent respectively.
- 3.11 Total cropped Area under Dirang watershed is 2126 ha, out of which the net sown Area is 2075 ha.
- 3.12 The Monpas have a complicated system of land rights, which differs fundamentally from that of most of the other tribes of Arunachal Pradesh
- 3.13 Infrastructure facilities in the watershed area are inadequate especially in the area of basic amenities and Industrial infrastructure.

4. Analysis of Resources Use

- 4.1 Varied altitude and undulating topography have resulted micro-climatic variations and these form the basis of agricultural diversification.
- 4.2 Shifting cultivation continues to be practised in the higher altitude zones of the micro-watershed with a cycle of two years of use and eight years of fallow while permanent cultivation is practised in the middle and lower zone. Agriculture in the valley is virtually organic where the Monpa community practise traditional methods of enriching soil fertility by applying mulching technique
- 4.3 The activity of a farmer varies zone wise as he grows different types of crops, fruits and vegetables as per suitability of the area. Activities of a farmer get more livestock based as one goes higher up the altitude in the micro watershed.
- 4.4 The micro watershed favours growing of a large number of cereal and pulse crops namely rice, maize, millet, buck wheat, wheat, barley, soyabean, bean and rajma. Soyabean, bean and rajma are grown as a mixed crop with the other crops in the lower and the middle zones
- 4.5 The total marketed surplus of field crop was 2.56 MT in 2002-03 & the contribution of cereals was 91.40%. The overall marketed surplus in the lower zone is more than the other zone. Out of the total cereal production of 2.34MT the share of Maize was 76.49 percent
- 4.6 The total area under Horticulture crop is 193.11 ha out of which 71.95 percent is under spices. Followed by vegetables (21.10%) & fruits (6.95%). The total production of horticultural crops in the Dirang valley was 1063.69 MT during 2002-2003 out of which the contribution of vegetables was 71.36% followed by spices (25.32%) & fruits (3.06%).
- 4.7 In case of fruits the Kiwi, Apple, Walnut, Orange, Pear, Plum, Olive etc are grown but there is hardly 13.15 ha of land under organised cultivation that also limited to Apple & Kiwi.
- 4.8 Marketed surplus in the horticultural sector during 2002-03 was only 5.68MT out of which the contributions of vegetables were 87.32 Percent, Spices (7.09%)& Fruits (7.2%)
- 4.9 The productivity of field crops as well as horticultural crops is much better than the national average.
- 4.10 Nature has been exceedingly kind and has endowed this beautiful valley with diverse forests and magnificent wildlife resources. The richness of life forms i.e. the flora & fauna that occur in these forests presents a panorama of biological diversity with over 5000 plants, about 85 terrestrial mammals, over 500 birds and a large number of butterflies, insects and reptiles. Out of about a thousand species of orchids in India, *over 100 species* are to be found in Dirang alone.
- 4.11 The forest of the micro watershed is also rich in a wide spectrum of medicinal & aromatic plants, which have high economic value in the international markets .In recent past the forest produce found in this region have come

- under heavy pressure due to un-systematic exploitation by the unscrupulous traders operating from Tezpur and Dahekijuli.
- 4.12 There are seven villages in the district where Oak Tasar is being cultured out of which four villages located in the low altitude zone comes under Dirang circle.
 - 4.13 Dirang accounts for 36.59% of the livestock population of the district. The people of the area depends on livestock not only as a source of power to plough their fields but also as a source to meet their domestic requirements for milk, meat, wool & transportation of goods.
 - 4.14 Cattle rearing for milk production are one of the most promising activities in the low zone however it is not coming up as viable economic activity for various reasons.
 - 4.15 In the high altitude zone where the temperature is near to freezing point the Yak is the most important livestock. 98.63 per cent of the Yak population of the district is concentrated in the highlands of the watershed.
 - 4.16 Fishery is one sector that has got limited scope and prospect in the watershed area due to lack of availability of suitable land for construction of pond.
 - 4.17 The level of processing and manufacturing activities in Dirang is very low as such the area is an industrially backward.
 - 4.18 Some of the key non-farm activities that are practised in the area in limited scale and are mostly concentrated in *low altitude zone* (like Handloom and Handicrafts, Yak Products, Fruit and vegetable Processing, Aromatic Oil:Geranium, Water mill).
 - 4.19 The volume of service & business activities like grocery shops, hotels, restaurants, saloons, beauty parlour, medicine shop, book stall, cloth store, tailoring, meat shop, fish shop, Pan shop, garage, P.C.O, Travel counter, electronics shop, electrical shop, hardware shop & wine shop are concentrated in Dirang bazaar.
 - 4.20 On an average around 13 Tourist visit per day Dirang regularly i.e. 5400 tourists annually (approx). The Apple Farm (*Zimthung*), Kiwi Orchards (*Rungkhung*), Gompas (*Dirang, Namchu*), Hot Springs (*Liss Gompache, Bisum-phudung*), Sheep Farm (*Sangti*) and The Yak Farm (*Nikmadong*) are amongst the favourite tourist sites in the area.

5. Potential Activities and their Development Support

For identifying the potential income generating activities, SWOT analysis has been carried out. A large number of factors namely; their resources availability (*raw material, manpower etc.*), perishability of the products, economic indicator (*demand profile, profit margin*), market attractiveness, competitiveness, marketed surplus, community support and interest, entrepreneurship, business capacity, labour capacity, implementation, investment, impact on environment, transport and communication, cultural affinity etc have been considered in SWOT analysis. The analysis exhibited strength and opportunities in as many as *eleven different types of activities*. The selected activities are Kiwi cultivation, *Apple cultivation, Walnut cultivation, Vegetable production, Common Facility Centre for Agriculture/Horticulture Product Marketing, Mushroom Production, Dairy Farm*

(Cow), Indoor Oak Tasar Silkworm Rearing, Geranium cultivation, Tourist Transport package, and Commercial Complex at Dirang.

Based on the selected activities an Action Plan has been prepared. The Action plan gives thrust in terms of development support (*forward/backward linkage*) in a time frame of 5 years duration. The potential activities along with the zonal location and physical and financial implications are provided below.

Sl. no.	Activity	Location	No. of potential unit
1	2	3	4
1	Kiwi cultivation	Low Zone	30
2	Apple cultivation	Middle Zone	100
3	Walnut cultivation	Low Zone	20
4	Vegetable production	Low Zone	15
5	Common Facility Centre for Agriculture/Horticulture Product Marketing	Low Zone	1
6	Mushroom Production	Middle Zone	5
7	Dairy Farm (Cow)	Low Zone	5
8	Indoor Oak Tasar Silkworm Rearing	Low Zone	5
9	Geranium cultivation	Low Zone	25
10	Tourist Transport package	All Zones	1
11	Commercial Complex at Dirang	Low Zone	1
Total			208

Altogether 208 units have been proposed of which nearly half is Apple cultivation, followed by Kiwi cultivation, Geranium Cultivation, Walnut Cultivation, Vegetable Cultivation, Mushroom cultivation, Dairy Farming, Indoor Oak Tasar silkworm rearing, Common Facility Centre for Agriculture/Horticulture Product Marketing, Tourist Transport Package and Commercial Complex. The financial implications required in order to grow all the identified activities has been estimated at **Rs 418.20 lakh**. The annual phasing of investment during five years is as under-

Financial break-up of Potential Activities

(Rs. In lakh)

SL. No..	Activity	1ST YEA R	2N D YEA R	3R D YEA R	4T H YEA R	5T H YEA R	TOTAL
1	2	3	4	5	6	7	8
1.	Horticulture Activity	--	--	--	--	--	--
a)	Kiwi Cultivation	13.2	13.2	13.2	13.2	13.2	66
b)	Apple Cultivation	24.2	24.2	24.2	24.2	24.2	121
c)	Walnut Cultivation	0.68	0.68	0.68	0.68	0.68	3.4
d)	Mushroom Cultivation	1.07	1.07	1.07	1.07	1.07	5.35
e)	Vegetable Production	1.8	1.8	1.8	1.8	1.8	9.0
2.	Medicinal and aromatic plant	0	0	0	0	0	0
a.	Geranium cultivation	7	7	7	7	7	35
3.	Animal Husbandry and Dairy	0	0	0	0	0	0
a.	Dairy Farm	1.41	1.41	1.41	1.41	1.41	7.05

4.	Sericulture	0	0	0	0	0	0
a.	Oak Tasar Culture	0.381	0.381	0.381	0.381	0.381	1.905
1	2	3	4	5	6	7	8
5.	Tertiary sector	0	0	0	0	0	0
a.	Common Facility Centre for Marketing Agri./ Horti. Products	15	0	0	0	0	15
b.	Tourist Transportation	34.5	0	0	0	0	34.5
c.	Commercial complex at Dirang	120	0	0	0	0	120
	Total	219.241	49.741	49.741	49.741	49.741	418.205

6. Capacity Building /Skill Development

In order to catalyse development, priority has been accorded to capacity building of the watershed community taking into account the **high rate of illiteracy (52.24 %) and poverty (81.31%)** in the area. This has been considered as an essential intervention toward the successful implementation of the watershed project, which would ensure sustainable livelihood generation of the people in one hand and promote regional growth and development on the other. An amount of Rs 32.70 lakh is estimated for capacity building programmes for various stakeholders associated in the potential activities of the Plan within a time frame of five years. The summaries of the capacity building programmes have been given below.

Sl. No..	Activity	Total no. of training programmes	Total amount
1	2	3	4
1	General awareness camp	20	3.00
2	Capacity building through training		
2.1	<i>SHG formation & management</i>	6	2.05
2.2	<i>Entrepreneurship dev.</i>	6	4.5
2.3	<i>Skill development</i>		
2.3.1	Horticulture Activity		
a)	Kiwi Cultivation	5	3.00
b)	Apple Cultivation	15	10.50
c)	Walnut Cultivation	5	3.75
d)	Mushroom Cultivation	2	0.50
e)	Vegetable Production	3	1.50
2.3.2	Medicinal and aromatic plant		
a.	Geranium cultivation	10	2.50
2.3.3	Animal Husbandry and Dairy		
a.	Dairy Farm	3	0.90
2.3.4	Sericulture		
a.	Oak Tasar Culture	2	0.50
	Total	77	32.70

7. Return on Investment

The investment as worked out in the plan is likely to generate Rs 11.64 lakhs in the 1st Year, Rs 25.24 lakhs in the 2nd Year, 166.54 lakhs in the 3rd Year, 437.44 lakhs in the 4th Year, 709.34 lakhs in the 5th Year, 979.10 lakhs in the 6th Year, 1241.15 lakhs in the 7th Year, 1374.00 lakhs in the 8th Year, 1376.75 lakhs in the 9th Year, 1379.5 lakhs in the 10th Year, 1407.25 lakhs in the 11th Year, 1434.5 lakhs in the 12th Year, 1461.75 lakhs in the 13th Year, 1489.75 lakhs in the 14th Year, and 1517.25 lakhs in the 15th Year.

Annual break-up of Income Generation for fifteen year of the implementation of the project

		(Rupees in lakh)														
Sl. No.	Activity	1 st Yr	2 nd Yr	3 rd Yr	4 th Yr	5 th Yr	6 th Yr	7 th Yr	8 th Yr	9 th Yr	10 th Yr	11 th Yr	12 th Yr	13 th Yr	14 th Yr	15 th Yr
1	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Kiwi cultivation	0	0	0	129.60	259.20	388.80	518.40	648.00	648.00	648.00	648.00	648.00	648.00	648.00	648.00
2	Apple cultivation	0	0	100.00	200.00	300.00	400.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
3	Walnut cultivation	0	0	0	0	0	0	0	0	0	0	24	48	72	96	120
4	Vegetable production	1.08	2.16	3.24	4.32	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40
5	Common Facility Centre for Agriculture/ Horticulture Product Marketing	2.00	2.00	2.00	2.00	2.50	3.00	3.50	4.00	4.50	5.00	6.00	7.00	8.00	9.00	10.00
6	Mushroom Production	0	6.30	12.60	18.90	25.20	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50
7	Dairy Farm (Cow)	0	1.41	2.82	4.23	5.64	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05
8	Indoor Oak Tasar Silkworm Rearing	0.56	1.12	1.68	2.24	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
9	Geranium cultivation	0	0	29.70	59.40	89.10	118.80	148.50	148.50	148.50	148.50	148.50	148.50	148.50	148.50	148.50
10	Tourist Transport package	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.50	7.00
11	Commercial Complex at Dirang	0	2.00	2.00	2.00	2.50	2.50	2.50	3.00	3.00	3.00	3.50	3.50	3.50	4.00	4.00
	Total	11.64	25.24	166.54	437.44	709.34	979.10	1241.15	1374.00	1376.75	1379.5	1407.25	1434.5	1461.75	1489.75	1517.25

8. Development Approach

The plan identifies and prioritizes potential Farm and Non-Farm sector activities in the Dirang Watershed and also the interventions by stakeholders need to be taken up. The plan takes into consideration the **Micro Climatic Variations** prevailing in the watershed and accordingly selected developmental activities are classified in three **Agro Climatic Zones** i.e. low, middle and high zone. In order to have economics of scale of selected activities, further cluster approach have been followed. The marketing both input-output being a serious problem in the area, necessary action for backward and forward linkages of activities have been worked out. This has been done so that each activity cluster functions at optimum level with clear input–output-marketing system. Overall the planning process focuses on the vision of a healthy, functional Dirang watershed with active participation of the stakeholders. The designing the action plan has been made in mission mode for achieving overall economic growth and welfare of the people in an eco friendly way.

9. Conclusion

In order to meet the challenges to rectify the development imbalances and to accord due priority to sustainable and holistic development in the highlands, the initiative taken by North Eastern Development Finance Institute is highly appreciable. The proposed action plan of Dirang valley incorporated in this volume is basically of indicative nature. Essence of this plan is **Eco-restoration** effort for sustainable development. The thrust of this plan is on all round economic and social transformation taking into account the constraints of highland areas, through a multi pronged action plan, aiming in the process, to reach out to most disadvantaged sections of the society. In order to harness the opportunities explored, immediate implementation of the key provisions of the Action Plan appears to be essential by involving the watershed community. Secondly, it is suggested that the opportunities identified under the farm sector activities are harnessed following the Agro climatic zonation Approach. This is important for restoration and maintenance of ecological health on the one hand and optimization of economic benefit on the other.

We have made incessant efforts to bring this plan document in the present form against all odds and limitations, however, we are confident that necessary interventions as proposed can be effectively made in consultation with stakeholders with necessary minor adjustments wherever required.

