PARTICIPATORY LIVELIHOOD PLAN OF A WATERSHED VILLAGE: A CASE STUDY IN JHARKHAND, INDIA

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ABSTRACT

Land and water are essential elements for the sustainability of the human being. Indiscriminate exploitation, injudicious and reckless use of resources for food, fodder and fuel has resulted in excessive soil erosion, deforestation and moisture stress. The end of result is resource poor situation leading to reduced food, fodder and fuel productivity. The new approach to development provides a paradigm shift in the traditional approach where the role of the government is changed from that of governance to facilitation. It envisages a bottom-up approach whereby the users' group themselves decide their work programme. In the above backdrop, a participatory exercise was carried out in the Sirka-Sonuabera village, which is a part of *Vivekananda JalchhajanSamity* Micro-Watershed project. The basic objective of this exercise was to frame a comprehensive land utilization plan to enhance the livelihood opportunities of the villagers using the benefit of micro-watershed project. The study highlights the bio-physical and socio-economic characteristics of the community to determine the problems encountered by the community and to recommend appropriate plans of action in addressing these problems through villagers' participation. Finally a plan has been finalised with a hope that, it would change the livelihood condition of the community because participation fosters ownership of the people over resources and produce better results.

Key Words: Peoples Participation, Livelihood, Land Utilization, Watershed.

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Introduction

As the international development goals have widened from merely increasing food production to poverty reduction and environmental sustainability, protecting the environment is a big challenge for developing nations, and greater emphasis should be given to check the exploitation of the natural resource base. This is becoming more intense with the burgeoning population causing food security problems in developing countries (Nagendra, 1994). Hence careful and concerted efforts are needed for efficient and effective management of natural resources for increased productivity of the soils.Land and water are essential elements for the sustainability of the human being. Indiscriminate exploitation, injudicious and reckless use of resources for food, fodder and fuel has resulted in excessive soil erosion, deforestation and moisture stress. The end of result is resource poor situation leading to reduced food, fodder and fuel productivity. In order to save the two basic resources i.e. land and water and at the same time toincrease the production of our requirement of food, fodder and fuel in a sustainable basis, government has initiated programmes for the development of land and management of water resources on watershed basis.

Several government and non- government agencies have launched watershed development projects to tackle some of these generic problems with the objectives of soil conservation, improving the land productivity and promoting appropriate technologies for efficient and sustainable use of natural resources. However, many watershed projects around the world have not performed well because of the poor community participation (Johnson et al., 2001). The key to the success of any watershed project and its sustainability depends on people's participation. For achieving the desired participation of people, the roles of community organizations, groups and other stakeholders are crucial. Local people must play an active role starting from project design, moving to implementation and the project maintenance (Ayodhya and Papa, 1993). In this context, a participatory watershed management approach is considered as the ideal for achieving food security and sustainability.

The new approach to watershed development provides a paradigm shift in the traditional approach where the role of the government is changed from that of governance to facilitation. It envisages a bottom-up approach whereby the users' group themselves decide their work programme. In the above backdrop, a participatory exercise was carried out in the Sirka-Sonuabera village, which is a part of *Vivekananda JalchhajanSamity* Micro-Watershed

project.The basic objective of this exercise was to frame a comprehensive land utilization plan to enhance the livelihood opportunities of the villagers using the benefit of micro-watershed project. The study highlights the bio-physical and socio-economic characteristics of the community to determine the problems encountered by the community and to recommend appropriate plans of action in addressing these problems through villagers' participation. To accomplish the benefit of watershed projects, the villagers eagerly participated in the planning exercise and prepare a year round crop plan. During the participatory exercise, the researchers realise the readiness of the villagers during the entire course of activity because the 'stick of control' were handed over to them. Finally a plan has been finalised with a hope that, it would change the livelihood condition of the community because participation fosters ownership of the people over resources and produce better results.

The Research Setting

Sirka-Sonuabera village, which comes under the *Vivekananda JalchhajanSamity* is located about 40 km from Ranchi town of Jharkhand, Indiaand about 15 km away from Angara block development office.The village is inhabited by two ethnic groups namelyBedia and Munda. The area is composed of undulating tracts of high ridges and low valleys. The different types of land like hills & hill slope, foothills, upland, medium and low lands are found in this watershed. The micro watershed is surrounded by hillocks and forest area, which contributes to the internal drainage system of the project area.The settlement pattern of this village is nucleated and huts are arranged in a linear fashion beside the main entrance of the village. The settlement is surrounded by the agricultural field and forest lands, utilized by the villagers for cultivation and grazing of their livestock. Houses of the village include both *kutcha* and *pucca* type. The house type is an indicative of mixed population of poor and well to do household in the village. Agriculture is the major source of livelihoods. In addition to that, villagers also migrate to the cities in search of earning by doing manual labour.

Table 1:Basic information about the villagers

Variables (1)	Frequency (2)	Percentage (3)
Ethnic GroupsHousehold		
Bedia	16	53.3
Munda	14	46.7
Total	**30**	**100**
Population		
Male	**74**	**49.0**
Bedia	36	23.8
Munda	38	25.2
Female	**77**	**51.0**
Bedia	38	25.2
Munda	39	25.8
Total	**151**	**100**
Sex Ratio		
Bedia	105.5	-
Munda	102.6	-
Total	**104.05**	**-**
Principal Source of Income		
AgricultureAgricultural	21	70.0
LaborWage Labor	3	10.0
Service	5	16.6
Total	1	3.4
	30	**100**
Average Family Size		
Bedia	4.6	-
Munda	5.5	-

Source: Field survey 2013.

It is apparent from the above table that the village is inhabited by only 151 souls distributed in 30 households. The small population size of the village was the only intention behind its selection because our major aim was to involve as many villagers as possible in the participatory exercise.

Theoretical Context and the Method of Planning

The livelihood development plan of the villageis based on the Sustainable Livelihood Framework (SLF) of DFID. DFID adapts a version of Chambers Conway's definition of livelihoods:

Livelihoods consist of the capabilities, assets – both material and social resources - and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks,maintain or enhance its capabilities and assets, and provide net benefits to otherlivelihoods locally and more widely, both now and in the future, while notundermining the natural resource base (DFID, 2000).

The extent to which a livelihood issustainable is determined by the interaction of several forces and elements. Theseare set out conceptually in the SLF.The present study has been framed and arranged according to the elements of SLA framework.

A comprehensive procedure was followed in the preparation of micro plan related to livelihood strategies of the selected village. For that purpose rapport building with the villagers was made by the researchers to know thevillagers and understand their problems and priorities. Village Meetings and Focused Group Discussion (FGD) was organized, inwhich the issues of livelihood strategies and possible outcomes were discussed. To assess the livelihood assets of the village, household wise data ofall the villagers were collected incorporating few literate villagers in the team as volunteers. The relevant primary data pertaining to the present study were collected from selected respondent with the help of specially designed pre-tested structured schedules. Apart from the different tools used during PRA exercise, data have also been collected by the known social research methods like case study, observation, isolation and group interview. The data on landholding of a household, family size, and number of adult male member(s) is straightforward. The educational status of a household is determined by taking the total number of literate members of the household. The occupation of a household is determined by considering the main source of income of the household. The information related to main occupation of male members along with their income and amount of agricultural land owned were considered to determine the household occupation. The villagers did Wellbeing Analysis of the households (Classifying the

villagers into four categories viz; Very Poor, Poor, Manageable and Well–off)in terms of their standard of living and ownership of assets of cultivable land and actual annual income from all types of livelihood opportunities.Livelihood Analysis with special reference to utilization of land for crop cultivation before the initiation of watershed programme was also done with villagers to identify the specific problems of the community, its probable solutions, constraints & opportunities within the communitySeparate meetings with different categories were conducted to understand their specific problems. Triangulationof the data was made by the researchers accompanying village volunteers by visiting sample householdsgiving priority to poor households. Baseline data of the Village was shared with the villagers for validation andapproval of the villagers.Whole village area was covered during transect walk with the villagers todelineate village boundary and to know more about the status ofdifferent natural resources. Discussions have been made with the villagersregarding various problems and possible solutions related to naturalresources.Final presentation of the issues, problems and resources available werepresented to the villagers. In the light of the key problem, an action plan for sustainable cropping throughout the year wasdeveloped in which most of the households of the village were present. Despite all the good efforts, there were few areas of concern regarding the quality of data that researcher could not undermine in framing the action plan. Crop production figures, field sizes, and information on age are most suspects during the interviews, primarily as a result of problems of respondent recall or incomprehension rather than deliberate manipulation. Again for example, many villagers could not easily quantify their production since crops are not harvested at once, but continuously as soon as they are ready. Furthermore, modern measurements, such as kilograms, acres and hectares are not commonly used in rural areas, and are hence not meaningful or even familiar to many. The conclusions of this study are drawn with these limitations in mind. In all cases efforts were made to verify the sources and identify possible areas of error. Moreover, the resulting data has been evaluated at least twice during focused group discussions and key informant interviews in the village, providing triangulation.

Livelihood Assets of the Village

A Sustainable Livelihood Approach (SLA) was used for profiling village livelihoodassets, drawing heavily on primary information and analysis. Assets do not only include those owned or controlled directly byhouseholds or individuals, but also publicly owned assets and intangible

assets such as social support. The sustainable livelihoods framework presents the main factors that affect the sources of people's livelihoods and also make typical relationship between them. In number of cases participatory methods have been used to identify the factors affecting sustainable rural livelihoods (Wekwete, 1998). The conceptual framework of Department for International Development provides attention to measured changes in the different factors, which contribute to livelihoods especially human, social, financial, physical and natural capital assets (Pasteur, 2001). The present study adopts the sustainable livelihoods framework of Department for International Development (DFID) to assess the livelihood assets in the studied village to prepare a participatory action plan with reference to land based cropping system using the benefit of watershed development programme.

In the field of development studies, "human capital" is a widely used term with various meanings. However, in the context of the sustainable livelihood it is defined as "Human capital represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives" (DFID, 2000). In terms of human capital, the village is a house of 151 souls with a high sex ratio (104.05) in favor of females. The analysis of the age data suggests that the percentage of youth population below the age of 35 is above 70% and a child-women ratio of 0.70 indicates low birth rate. During the survey it was found that several government as well as non-government organizations are working in the village to create awareness about maternal health among adolescence and married womenSuch awareness programmesplay an important role in creating knowledge related to the family planning practices among the females. It was also found during the interaction with the villagers that some of the newly married couple has adopted the surgical method of birth controlwith two children. Though the village is situated in a location with lack of transportation facilities but still the villagers used to visit in the health centers to receive treatment from the trained medical practitioners instead of depending on traditional healers. Data concerning sanitation awareness also depicts a good picture but the literacy status shows high percentage of illiterate population in the village. It has been mentioned earlier that 70% of the people depends on land based farming but the migration rate is quite high during the lean agricultural season. Before the implementation of the watershed programme, the villagers used to cultivate once in a

year due to the non-availability of irrigation facilities during summer months that forced them to migrate to the cities to sustain their livelihoods.

"Financial capital" denotes the financial resources that people use to achieve their livelihood objectives and it comprises the important availability of cash or equivalent that enables people to adopt different livelihood strategies. The financial status of the studied village in terms of monthly income shows that majority (23) of the family earns less than Rs. 1000/- a month. The need for liquid cash at the time of distress is met out by the functioning SHG in the village. The villagers used to contribute either in cash or in kind to the SHG that form an important financial asset of the village. The deposited amounts are used to provide loans to the group members and the outsiders at a fixed rate of interest earmarked for the insiders and outsiders. Beyond that each and every villagers have some fixed material assets in the form of jewelry, utensils, house, livestock etc. that are also used either to generate income or to earn cash by selling at the time of distress.

Natural capital is the term used for the natural resource stocks from which resource flows and services (such as land, water, forests, air quality, erosion protection, biodiversity degree and rate of change, etc.) useful for livelihoods are derived. The natural capital of the village can be broadly classified in three main categories viz. Land Resources, Water Resources, and Forest Resources. The productive utilization of the village lands are of three types like agricultural use, horticultural use and grazing of animals. It was observed during the study that the villagers use their lowland for agricultural purpose and upland for horticultural and grazing purpose. In the studied village majority of the farmers belongs to marginal category and their farming practices are principally based on rain-fed irrigation and hence mono-cropper.

Water is mainly used for drinking, irrigation, bathing, washing, cooking and other day to day activities. The main source of water for the villagers is a rivulet passing through the village. Besides, villagers use tube well for the drinking purpose and a well for irrigation during summer season. No statistical data on forest resources are available but during the initial investigation it was informed by the community that almost all households of the village make use of the forests as a source of fuel wood, building material and for collection of NTFPs. *Sal* leaves are the most

commonly collected species which are converted and used as *dona*. The most widely collected grass species in the area are *Kasi*, *Chero*, *Chorchatta*, *Sabai*, which are commonly used to make broom. Some perennial species of grasses grown in the agricultural field and forest lands were collected to fulfill the fodder requirements. *Sabai*grass is also used as the raw material for rope making. *Sal* twig known as *Dantakathi* is most commonly used as a chew stick for cleaning and brushing teeth. *Mahua* flower is a very common species found in forests as well in the private lands. The flowers are eaten fried, and also powdered to make a cake and fed to the cattle. *Mahua* flowers are usually stored in home after drying. Another popular use of *mahua* flower is to make liquor for consumption. Wild mushrooms locally known as *rugra* are collected from the forests mainly from June to October and used for both consumption and sale. *Mahua, Kusum* and *Karanj* are amongst the edible variety of oil seeds available in the forest. *Karanj* seeds, collected during February to May, are also used to extract oil that applied in the body during bath. The oil cake is used as manure. Many medicinal plants are available in abundance in the forests but very few families collect the same. *Kend, Bel, Bhelua, Rasuna, Kalmegh, Bakas, Datura, Neem, Brahmi* etc. are some of the species found in the forests. These species are extensively collected by the villagers and local medicine man for healing.

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods, such as affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean, affordable energy and access to information. Almost 96% households of the village are not having *Pucca* wall and not havingadequate roofing like. Though people have access to safe water but they depend only on four tube wells out of which three tube wells dries in summer. In summer the problem of water scarcity becomes severe for which women have to wait for a long time to fetch water for domestic consumption. There is not a single latrine in the village. The villagers mostly depend onGetalsud market for their daily needs.

There is much debate about what exactly is meant by the term “social capital” and the aspects it comprises. In the context of the sustainable livelihood it is taken to mean the social resources upon which people draw in seeking for their livelihood outcomes, such as networks and connectedness, that increase people's trust and ability to cooperate or membership in more formalised groups and their systems of rules, norms and sanctions.A watershed committee is

constituted with the local villagers through Gram Sabha meeting to implement the Watershed project with the technical support of the WDT (Watershed Development Team) in the grass root level. There is a separate bank account for the watershed committee to receive funds for watershed projects which are utilizing for undertaking developmental activities in the village. A SHG group is also operating in the village supported by the community based organization named Vivekananda Seva Sangha of Ramakrishna Mission Ashrama, Ranchi.

The above description entails that the area is beset by high endowments of three capitals viz., natural, social, and human capital of livelihoods but the lack of physical and financial capital results in seasonal unemployment and poverty. The farmers in thisvillage are very poor and their ability to take risk and invest necessary inputs for optimizing production is low. For the last few years Government and other development agencies have made structural changes in the villages through interventions of agricultural extension and research services, which helped to improve and provide better livelihoods in the village to some extent. There are different governments and non-government organizations working in the villages and these agencies are involved in providing training on agriculture, extension services including veterinary and agriculture needs of farmers.

Existing Livelihood Strategies and Problem Identification

Households engage in certain routine strategies (involving various activities) toensure their livelihood. For instance, they may establish a certain division of laborbetween their members, let some resources (e.g. land) to other people for a rent;allow part of their labor force to be hired for a wage; send some family member towork at some distant location and send back remittances every month; raise somelivestock for family consumption or for exchange and so on. Besides these routineactivities, a household may have some extraordinary strategies and activities to copewith times of distress. These coping strategies (or coping mechanisms) may include awide range of variations of their ordinary livelihood: they may send more people tothe labor market, liquidate livestock, reduce consumption, withdraw children fromschool and put them to work, and so on. Some of these coping mechanisms are onlyemergency measures, intended for a very short time, whilst others may be sustainedfor a longer period.

The study observed that Sirka-Sonuabera village represents an important livelihood dimension to researchers because of its diversity regarding people's options and choices to gaining a better living. The research revealed that the people of Sirka-Sonuabera constructs livelihoods from multiple economic activities like farming, fishing, NTFP collection, animal husbandry, service etc. but principally depends on crop cultivation. The study hence captured farming-based socio-economic activities undertaken by the villagers in order to sustain their livelihoods. Particularly important was to appreciate the role of farming in enhancing villager's livelihoods. In addition, it was also important to understand the wider livelihood issues and interactions between farming and trading in general and to what extent these activities have on either improving or disabling people's choices to gaining a better living. The people of Sirka-Sonuabera have several livelihood strategies and the relative importance of these strategies has changed over the past years in response to changes in local economic landscape.

Table 2: Livelihood strategies in Sirka-Sonuabera

Strategies	**Activities**
Crop production	Growing crops for domestic consumption Growing crops for sale such as potatoes, onions, cabbages, tomatoes, mustard,ladiesfinger,brinjal,dhania,spinach,chilli,urd,maize,paddy, pumpkin,arahar,etc.
Livestock rearing	Rearing livestock for consumption. Rearing livestock for sale especially chicken.
Forest resource harvesting	Collection of fuel-wood for consumption and sale. Collection of *sal* leaf for sale. Collection of other NTFPs like honey, *rugra*etc. for consumption.
Non-farm	Carpentry, Labour, Grocery shops, Service, traditional health practitioners.

Source: Field survey 2013.

A review of coping mechanisms reveals that a very insignificant group of small and medium farmers is able to cope with adverse climatic conditions merely through the sale of available stocks. On the other end of the spectrum, marginal farmers can only resort to seasonal migration due to lack of any productive assets or availability of alternative employment options in the

village. Marginal farmers use a variety of adaptation options such as sale of cattle, shifts to other subsistence crops, wage labor, as well as seasonal migration. This range of options, however, constitutesonly temporary coping measures. Options that enhance longer-term adaptive capacity(such as institutional credit, crop insurance, and use of drought-resistant varieties)are not used by farmers due to procedural complexities and stringent eligibilitycriteria, compounded by lack of awareness.The analysis of the seasonal land use for crop cultivation indicates that paddy is the subsistence crop grown in the village inall type of land. The area under cultivation during the kharif is comparatively much higher than the rabi due to non-availability of irrigation facility. Very few well to do farmers cultivate vegetables during the winter but the amount of land utilized is far below compared to the total cultivable land in the village

Table 3:Crop production profile (*Kharif*)

Crops	Area (Decimal)	No. of plots	Production (kg)	Income (Rs)
Paddy	2424	232	62778	13520
Maize	436	73	2975	12958
Urd	34	18	129	1272
Arhar	92	13	193	265
Sorgham	845	92	9757	113719

Source: Field survey 2013. 250 decimal=1 hectare.

Table 4:Crop production profile (*Rabi)*

Crops	Area(Decimal)	No. of plots	Production(Kg)	Income(Rs)
Wheat	29	5	503	538
Cabbage	26	5	874	742
Dhania	7	7	510	4823
cauliflower	26	6	530	5830
Tomato	108	11	1950	9646
Potato	944	77	24364	77910
Chilli	5	1	15	795

Pumpkin	2	1	14	1855
Maize	15	2	53	-
Mustered	10	4	100	3710
Brinjal	7	2	106	530
Onion	7	1	58	-

Source: Field survey 2013.

Domestic production of food grains plays an important role in providing foodsecurity. The villagers are habituated to cultivate paddy as a major crop along with Maize and Sorghum. The production decreases due to severe drought /dry during monsoon season occurring year by year. As a result food scarcity often arises in this village which compels the villagers to migrate to different distant places. The villagers are not accustomed to practice improved Farming system and also due to lack of assured source of irrigation. Assuming the implementation of watershed programme could improve the irrigation facility, a focused group discussion was carried out with the villagers to identify the agriculture oriented problems persisting in the village.During the problem identification exercise, it was found that weak crop based farming system makes them vulnerable to the other problems. The other important aspects include supply of agricultural inputs, farm machinery, irrigation facilities, cropping pattern and general aspects like health, housing facilities, sanitation etc. With the help of the villagers several problem has been identified that leads to the weak farming system and hampers sustainability of livelihood outcomes.

- Fragmentation of cultivable lands due to the disintegration of familial property reduced the average size of the operational landholdings.
- Non-availability of institutional credits makes the farmers vulnerable to the local moneylenders during the non-agricultural season that indirectly reduce their share of production during agricultural season.
- Villagers still follow the traditional method of cultivation with primitive technology. Such productive mechanism is suitable to sustain during the productive season but not enough to sustain round the year.

- Lack of awareness regarding the market price and poor marketing facility often handicaps them to receive substantial profit from the excess production.
- Non-availability of year round irrigation facility does not allow them to cultivate more than once in a year. Again the absence of electricity in the village also incapacitates them to use pump in fetching water from the perennial water sources around the village.

In order to address the above mentioned problem, a seasonal crop plan has been prepared with villagers considering the benefit of watershed programme could resolve the irrigation problem during the lean agricultural season. It is assumed that the seasonal crop plan could sustain their livelihood as well as enhance the land use, soil health and socio-physical assets of the village.

Participatory Intervention and Convergence Mechanism for Sustainable Livelihood

The most basic livelihood outcomes relate to satisfaction of elementary humanneeds. Theultimate outcome is to achieve the preservation of the household and to rear thenext generation with a desirable quality of life. People tend to develop the mostappropriate livelihood strategies possible to reach desired outcomes such as foodsecurity, good health, “well being” etc. Unstable or unsatisfactory livelihoodoutcomes may be the result of several factors which often interact, including lowlevels of livelihood assets, high degree of vulnerability to external shocks, andinsufficient livelihood support from surrounding institutions (e.g. local government,financial markets).

Watershed development is a single window, integrated area development program, which cannot perhaps be achieved just by followingintegration of resources using multidisciplinary approach with the funding supportfrom government of India through various watershed development programs. Thisshould involve harmonized use of resources available from other ongoing / existingsectoral and developmental schemes in the area through the participation of the villagers. Such resources can bedovetailed with the watershed program that will not only help in useful convergenceof various schemes and programs for overall development of the area but also

ineffective monitoring. Keeping these objectives in mind during the FGD & village meetings, some of the strategiesrecommended & approved with reference to crop.

During the planning exercise, the villagers were briefed with the concept of modern crop plan and its complexities related to management. The researchers explained that crop planning strategies in today's market require farmers to consider many production factors such as global climate change, ground water quality, and nutrient management, as well as food safety and quality, and impacts from invasive species, as they greatly influence crop planning, production and profitability. Pest control systems, cover crops, rotations, tillage systems, buffers and borders, and integration and coordination of inputs for single or multiple crops require well designed crop plans and optimization for continued utility in production systems. In addition, researchers seek the villagers view to contextualize the planning objectives considering the needs of small and marginal farmers of the studied village. The group discussion resulted in two specific model of crop plan based on season and water retention capacity of land.

Season based cropping: Due to the suitable subtropical climate Sirka-Sonuabera villagers cultivated different crops. The crops are mainly cultivated to local weather situation and local varieties are used to their agricultural field. The villagers classify land as per the suitability of crop to the land and that traditional knowledge helps them to select the variety of crops to cultivate in the specific land types. The following table explains the types of crop that could be cultivated in the village in different season due to the implementation of watershed programme.

Table 5: Season wise cropping options

Rainy season	Winter season	Summer season
1. Bottle gourd	1. Potato	1. Colocasia
2. Pumpkin	2. Tomato	2. Bitter gourd
3. Cow	3. Mustard	3. Cucumber
4. French bean,	4. Radish	4. Pumpkin
5. Maize	5. Onion	
6. Surgunja	6. Garlic	
7. Urad	7. Bottle gourd	
8. Arhar		

Cropping based on water retention capacity of land: Earlier in thesummer it was difficult to cultivate because the water table in the cultivable land were not suitable for cultivation.The villagers suggested the following month-wise crop options assuming the enhanced water table due to watershed intervention.

Table 6: Month-wise cropping options

Month	Crop
January	Tomato Brinjal Onion Garlic
February	Cucumber Bhindi Pumpkin Seeding grown for summer paddy.
March	Colocasia Bottle gourd Lablab Sowing summer paddy
April	Bottle gourd Pumpkin
May	Bitter gourd Cow pea Bhindi Tomato
June	Maize Maruwa Paddy Nursery preparation of different flowers.
July	Paddy sowing

	Cow pea Arhar Urad Potato Nizer French bean Ridge gourd
August	Vegetable cultivation
September	Tomato Mustard Radish
October	Potato Tomato Brinjal
November	Harvesting time
December	This time generally all crops are harvested.

Based on outcome related to crop options for cultivation during different season, the following cycle of crop rotation for 2 year cycle has been approved by the participants considering the requirements to soil health.

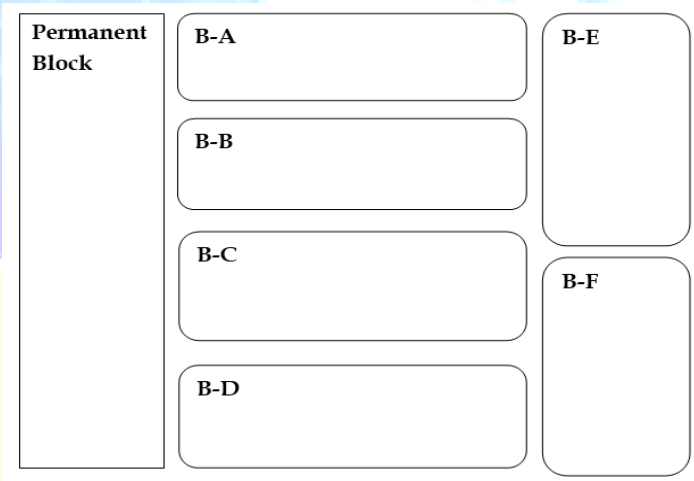
Table 7: Cropping pattern for 2 year cycle

Crop Family	Crop Family Sequence	Soil requirements	Soil benefits
Brassicas	Cabbage, cauliflower, radish, broccoli	Leafy crops need nitrogen-rich soil; may need liming	Radish breaks up soil structure.
Legumes	Pea, bean (broad, French and runner)	Well-drained but moisture-retentive; not Nitrogen-rich.	Fix nitrogen in roots for future crops, provides organic matter.

Alliums	Onion, garlic, shallot, leek	High organic matter; may need liming	Increase pest and disease resistance of adjacent crops
Solanacea	Potato, tomato	Root crops need stone free soil; not freshly	Root crops break up soil structure

Finally the villagers reached an agreement and prepared an optimal plan for cropping in a 1 hectare area of land suitable especially for the marginal farmers who are predominant in the village.One hectare which is equal to 250 decimal in local land holding measurement could be categorized into one permanent block of 120 decimal 4 temporary block of 20 decimal each and 2 temporary block of 25 decimal each as presented in the figure below.

FIG 1: SEASONAL FARM MODEL MARGINAL FARMERS



Permanent Block: It will be situated at the northern side of the farm and all types of perennial plants (e.g. Papaya, guava, mango etc.) could be planted in the blocks.

Block-A: The farm should be provided a fencing which could be utilized by the growing of climbing plants, e.g. Cucurbits during summer and rainy season and Peas in the winter.

Block-B: For growing of root crops, e.g. – Radish, Carrot, Beet etc.

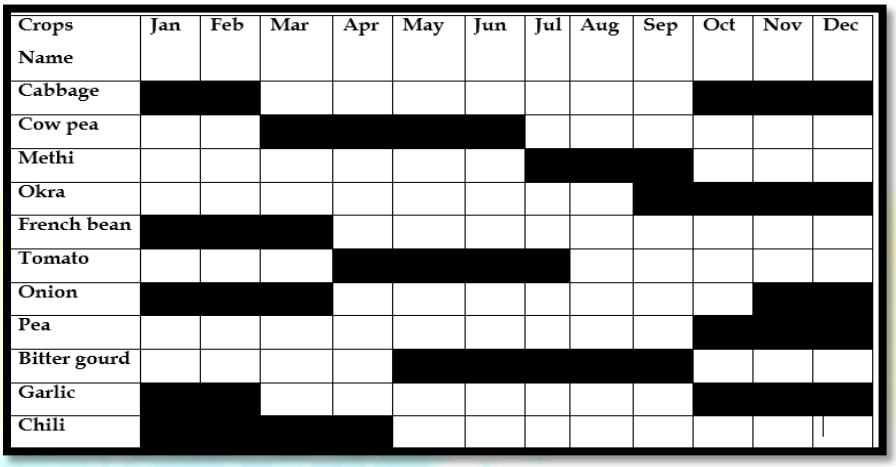
Block-C& D: Legume vegetables: Pea, French bean, cow pea etc.

Block-E: Spinach, cabbage, potato, tomato, brinjal, cauliflower etc.

Block-F: Methi, palak sag, kalmi sag etc.

Combining all the plots, the following cropping sequence is suggested.

Fig 2.seasonal crop calendar



Conclusion

The participatory livelihood planning in a watershed project area is a critical area of rural development that could support rural people in many ways. India's watershed development project is seen as flagship project of Ministry of Rural development, Government of India. Watershed management in India has undergone dramatic change to include greater stakeholder's participation for management of natural resources in a sustainable way. It is increasingly recognized that community participation was central to livelihood development. It has been noted that participatory watershed management projects have been raising income, agricultural productivity, generating employment and conserving soil and water resources.

The participatory multi-stakeholder planning process is essential for the development of sustainable livelihood plans. Although it involves a series of steps and processes, the experiences from the present study indicates that the process is inevitable for optimum utilization of watershed projects. The purpose of this planning exercise was to empower the community to have a clear understanding of their problems and realistic solutions to these problems. Sirka-Sonuabera is a good example of a community that is ready to mobilise both skilled and unskilled labour when it comes to developmental issues. If mismanagement of funds raised for development does not occur, then the youth and the physically fit of Sirka-Sonuabera can

provide the man power needed to realise identified projects. Based on the evidence found, it can be suggested that participatory livelihood planning could be a viable strategy of rural development for achieving sustainable rural livelihoods in India.

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