CHAPTER 1

INTRODUCTION

1.1 Statement of the problem

There is hue and cry in the entire world on how to meet livelihood demands of ever increasing population as the per capita availability of natural resources is shrinking day by day. And we cannot allow natural resources only to be utilized for human consumption because the ecological balance has to be maintained for the survival of the bio-sphere. This challenge is more in the developing and underdeveloped countries than in the developed countries, as the developing countries are required to meet the livelihood needs of people and conserve environment to comply with the international demands. In India, most people depend upon rain-fed areas for food, fodder, and fibre, because irrigated command constitutes only 32 per cent of the arable land (Bhandari et al., 2007). The livelihood needs can be met either by enhancing the productivity of the existing rain-fed areas or by extending the rain-fed areas. The success of productivity improvement programmes in rain-fed areas is limited because of the segregate focus on soil conservation, water conservation, crop production, crop diversification, employment generation, drought mitigation, and flood moderation rather than aggregate focus on livelihood improvisation. Also, the environmental concern restricts extension of rain-fed areas through conversion of forest land.

Land and water being the basic life-sustaining resources need to be restored, conserved, and utilized locally for meeting the livelihood demands of rural people (Bernstein *et al.*, 1992). Otherwise, there will be challenge from migration of people to urban areas in the search of income and employment. The large-scale top soil erosion due to environmental degradation also warrants conservation measures to retain land productivity. Therefore, the watershed development and management programme (WDMP) has been adopted in rain-fed areas to address natural resource conservation and livelihood improvisation of people through ecofriendly land and non-land based activities (Achouri, 2006; Hinchcliffe *et al.*, 1999; Kothari *et al.*, 1998; Reddy *et al.*, 2004; Yoganand and Gebremedhin, 2006). That is how the *Gandhian* philosophy of bottom-up development has gained momentum to improve the livelihood of the poor peasants through watersheds (The Ecologist, 1972). Schumacher (1973) redirected that 'small is beautiful' for effective control over the development process.

1.2 Indian WDMP scenario

The annual investment of around 1,000 million US\$ in WDMPs by Government of India and external donor agencies indicate priority given to this sector (Reddy et al., 2004). But, the success of the WDMPs is hardly impressive. The routine monitoring and control of the WDMPs is limited to physical and financial achievements. The absence of evaluation after withdrawal of the project implementing agency (PIA) has kept the extent of fulfillment of objectives of the programme in dark. In earlier studies, performance of the WDMPs has been viewed from isolated outcomes of yield improvement, crop diversification, natural resource conservation, income generation etc. rather than consolidated indicators (Bhandari et al., 2007; Sastry et al., 2002; Shah, 1998). Further, the factors contributing to success of the WDMPs such as extraordinary attention of the PIA, favourable topography, homogeneous social structure, typical market demand for a product, and charismatic leadership of a few publicized watersheds like Sukhomajri and Dhamala in Haryana, Kuppam in Andhra Pradesh, and Ralegan Siddhi in Maharashtra are non-replicable in nature (Chopra et al., 1988; Pangare and Pangare, 1991). Moreover, these factors are not the only contributors to success of WDMPs. The performance of WDMPs at present is difficult to monitor in the absence of prudent success indicators and

antecedents of success (Sharma, 2005). Therefore, the surge in funding and involvement of multiple agencies in WDMPs warrant identification of generic success indicators and antecedents of success so that pre-emptive measures can be taken to replicate success.

1.3 Understanding WDMP

The identification of success indicators and antecedents of success of WDMPs can only be possible by understanding the intricacies of lives and livelihoods in watersheds. WDMPs are usually adopted for micro-watersheds of about 500-1,000 ha geographical area draining through a common point (Fig. 1.1). The micro-watersheds are manageable bio-physical units for integrated use, regulation, and treatment of water, land, flora, and fauna resources within it (Jensen *et al.*, 1996; Swallow *et al.*, 2001). People residing within these micro-watersheds are the beneficiaries of the pogramme. The WDMP can only be successful by meeting the current livelihood needs of beneficiaries and keeping the natural resource intact to fulfil the future livelihood demands of the users (Ghai, 1994, Reddy *et al.*, 2004). Therefore, sustainable livelihood of beneficiaries is the key to success of WDMPs.



Figure 1.1 Schematic diagram of a micro-watershed

1.4 'SWOT' framework of WDMP

It is necessary to understand the environment-livelihood phenomena and processes operating within the WDMP to conceptualize sustainable livelihood of beneficiaries. 'SWOT' (strengths-weaknesses-opportunities-threats) framework of the WDMP demonstrates the functioning of livelihood of beneficiaries in micro-watersheds (Fig. 1.2). It is an improvisation over environment entitlement (Leach *et al.*, 1999) and The UK Department for International Development (DFID) livelihood (Soussan *et al.*, 2000) models. This understanding has been grounded on the earlier research evidence on watersheds (Reddy *et al.*, 2004), natural resources (Leach *et al.*, 1999), and livelihood sustenance (Carney, 2002) and observations of ground realities of WDMPs in different states of India.



Figure 1.2 'SWOT' framework of WDMP

Organizations and institutions are the internal strengths of the WDMP. They are responsible for developing and managing natural, physical, financial, social, and human livelihood assets/capitals of the micro-watershed. Resources of the watershed eco-system are developed through initiation, identification, and implementation of organizations. At macro-level, Ministries of Government of India and external donor agencies funding the programme decide the thrust areas such as rain-fed agriculture development, natural resource conservation, employment generation, drought mitigation, etc. of the programme. At meso-level, the state departments and the watershed development missions identify and prioritize districts and revenue blocks for the implementation of WDMPs. District rural development agencies delineate boundaries of the WDMP. The micro-level organizations of PIAs, watershed councils, self-help groups, and user groups finally implement the programme in the watershed. Environment entitlement model (Leach et al., 1999) demonstrates the role of apex to grassroots level policy making, enforcing, and regulating institutions for the use of land, water, and forest resources by the different stakeholders of WDMPs. The access to resources (entitlements), income opportunities (capabilities), and livelihood processes (functioning) are monitored and controlled by macro-, meso-, and micro-level institutions (Leach et al., 1999; Sen, 1985).

The DFID livelihood model (Soussan *et al.*, 2000) has only demonstrated threats perceived from the changes in market, environment, and demographics to the livelihood of beneficiaries. However, there can be opportunities from the evolving phenomena like payment for environmental services (NIVA, 2007), preferences for organic fruits, vegetables, and herbal products (Stagl, 2002), and non-land based activities of watershed beneficiaries. The livelihood system comprising of livelihood sources, strategies, and activities operates within external environmental, economical, social, technological, and infrastructural threats and opportunities.

Livelihood strategies are made by the community through participatory processes. The livelihood activities are pursued individually as well as collectively by users. It includes eco-friendly land and non-land based livelihood activities (DFID, 2000; Mahadi, 2008). The livelihood activities are agriculture, horticulture, herbal plant culture, floriculture, silviculture, agro-forestry, animal husbandry, pisciculture, non-timber forest products, and other income generating activities of self-help groups.

The economic sustainability of a household depends on the extent of judicious allocation of its annual income to different annual expenditure heads. Household expenditures are made on: (a) consumption of food, cloth, and shelter, (b) inputs for livelihood activities including health care as labour is a factor of production, (c) social payments of education, social function, and loan repayment, and (d) investment in livelihood assets of land, agricultural pump, goods carriage, improved animal breed, dug well, pond, etc.

1.5 WDMP sustainable livelihood model

Economic sustainability of households alone cannot capture sustainable livelihood in the context of WDMPs. The equity in costs and benefits distribution among beneficiaries is necessary to maintain communal sustainability. The extent of sustainable natural resource utilization practices encompasses ecological sustainability of WDMPs. It is felt from the observations of WDMPs in different states of India that the psychological happiness of beneficiaries also needs to be assessed as a consequence of WDMPs (Buss, 2000). Therefore, sustainable livelihood of WDMP beneficiaries can be evaluated on economic sustainability of households, psychological sustainability of beneficiaries, social sustainability of the community, and ecological sustainability of the watershed (Buss, 2000; Sharma *et al.*, 2005). Sustainability of livelihood of beneficiaries can be achieved by augmenting sources of livelihoods, facilitating livelihood processes, and promoting livelihood activities. Soil, water, and forest conservation can improve agriculture, horticulture, agro-forestry, non-timber forest produce, animal husbandry, and other income generating activities of beneficiaries. Community cohesions, interactions, relations, and participation including human capital of the community members can facilitate individual and collective livelihood efforts. Favourable natural, financial, historical, and infrastructural features of the watershed can further livelihood activities. For operational convenience, the five basic livelihood assets of natural, physical, financial, social, and human capital of a watershed can be regrouped into technological, social, and contextual capital. These capitals respectively can provide livelihood sources, facilitate livelihood processes, and promote livelihood activities (Bourdieu, 1986; Coleman, 1990; Krishna, 2002; Pretty and Ward, 2001).

The part of the physical capital that provides sources of livelihood constitutes adoption and absorption of natural resource utilization technologies. Adequate soil and water conservation measures can provide the sources of livelihood to beneficiaries (Perez and Tschinkel, 2003). Professional support is necessary to augment agriculture and allied activities, and other non-land based livelihoods (Turton *et al.*, 1998). Personal observation suggests that beneficiaries' understanding of the soil and water conservation measures improves the use and maintenance of measures. The change to eco-friendly land use can evidence sustainable natural resource utilization practices (Verbist *et al.*, 2005). Hence, technological capital of the WDMP can be captured on adequacy of measures, professional support, understanding of measures, and land use (Mohapatra and Suar, 2008).

The trust and reciprocity among beneficiaries are instrumental in accelerating livelihood processes including user group meetings and decision making on livelihood-promoting activities (Fukuyama, 1995). Membership of beneficiaries in formal and informal groups, and network within the community and with outside agencies enhance livelihood processes (Andersson, 2004). Beneficiaries' confidence on WDMP policy, institution, and on common property resources (CPRs) can instill security to meet their needs through WDMPs (Kerr, 2006). Effective functioning of watershed committees and congenial relations of office bearers with beneficiaries can facilitate decisions on livelihood options of beneficiaries. Studies reveal that participation of beneficiaries in WDMPs improves equity among them (Krishna, 2002). Beneficiaries' better health, education, and indigenous knowledge on soil and water conservation measures (Kerr and Pender, 1996) promote livelihood processes. Therefore, social capital of the WDMP can be measured on (a) cognitive components of trust and reciprocity among users, beneficiaries' confidence on policy, organization, and management of CPRs, and participation among users, and (b) structural components of membership in local groups, networking within and outside the community, performance of watershed committee, and interactions between office bearers and beneficiaries, and (c) beneficiaries' health, education, and indigenous knowledge (Kerr et al., 2007).

Communal history can promote collective livelihood activities (Tiffen *et al.*, 1994). The availability of attractive livelihood nearby discourages beneficiaries for adopting watershedbased livelihood. Favourable agro-climatic variables of size, shape, ground slope, and annual rainfall of the watershed accelerate livelihood activities in WDMPs (Deshpande and Reddy, 1991; Tideman, 2000). Soil needs to be added to the agro-climatic variables to assess water retention capacity of the soil. Clayey type of soils has better water retention capacity than sandy type of soils. Less irrigated land and few tree coverage of the watershed hamper livelihood activities. In practice, the resource poor sites are prioritized for WDMPs (Kerr et al., 1996). All inclusive infrastructures of social, informational, transactional, financial, transportational, and communicational are necessary than only transactional and transportational infrastructures (Farrington and Lobo, 1997) for supporting livelihood activities in WDMPs. Financial aid from WDMP agencies and monetary resources of the local community can help in development and maintenance of technological measures (Perez and Tschinkel, 2003). The spill over of benefits from other developmental schemes can further livelihood activities in WDMPs. So, the contextual capital of the WDMP can be evaluated comprehensively on history of collective action, remunerative livelihood opportunities nearby, physical setting, resource status, infrastructural availability, financial strength, and convergence of schemes. Contextual features of physical setting, availability of infrastructures, external and internal financial resources, history of collective action, and spill over of benefits from other developmental schemes can facilitate the efforts of the technological and social capital on sustaining the livelihood of beneficiaries. On the other hand, poor resource status and attractive alternative livelihood opportunities nearby can inhibit the efforts of the technological and social capital in WDMPs.

The technological and social capital constitutes the strength of the WDMP. The contextual capital reflects the opportunities and threats to livelihood activities. Therefore, the technological, social, and contextual capitals individually as well as collectively are critical in determining livelihood sustainability in WDMPs. Both technological and social capitals are likely to influence the contextual capital of WDMPs to sustain livelihood of the beneficiaries better. Sustainability of livelihood of beneficiaries cannot be achieved only by technological efforts, but by developing and managing technological, social, and contextual capital of the WDMP

efficiently and effectively. Therefore, sustainable livelihood model of WDMP is demonstrated in a techno-managerial framework (Fig. 1.3)

Figure 1.3 WDMP sustainable livelihood model

1.6 Objectives of the research

This study intends to reveal the success indicators and antecedents of success of the WDMPs. The objectives of the study are: (a) to examine the influence of dimensions of technological, social, and contextual capital on dimensions of sustainable livelihood of watershed beneficiaries, (b) to gauge the direct and indirect influences of technological, social, and contextual capital on sustainability of livelihood, and (c) to prioritize the antecedents in order of their importance in sustaining livelihood of beneficiaries for making appropriate interventions. The objectives have been achieved formulating a number of hypotheses and testing them by analysing responses obtained through interview, questionnaire survey, and discussion with beneficiaries and PIAs.

1.7 Scope of the study

The scope of the study covers the micro-watershed rehabilitation programmes in two agroclimatic zones in the state of Orissa (India) out of 15 in India. The studied WDMPs are funded by Ministries of Agriculture and Rural development, and Planning Commission of Government of India, and the DFID.

1.8 Organization of the thesis

The thesis has six chapters. Chapter 2 derives the hypotheses by critically examining the literature. Chapter 3 on methodology covers sample of the study, and measurement of constructs. Chapter 4 provides evidence to support or refute the hypotheses. Chapter 5 interprets results based on earlier literature and ground realities. Chapter 6 summarizes the findings, develops a theoretical framework, mentions the original contributions, states the policy implications, and limitations of the study. It also suggests the agenda for future research.