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Focus : Cluster Development

Ecology & Economy Integrated Clustering Approaches

Promoting Agripreneurship through Cluster Development

Influence of Indian Automobile Industry in Modern Production Method

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Occupational Stress and Workplace Spirituality

Financial Performance Analysis of Tata Consultancy Services Limited

Stress at Work Place: A Study with Reference to Police Personnel

Contents

| | | |
|--|-----|-----|
| Industrial Clustering in India: Conceptual and Policy Concerns — <i>Keshab Das</i> | ... | 345 |
| Ecology & Economy Integrated Clustering Approaches for Sustainable Development in India — <i>Ramachandra T. V. and Subash Chandran M. D.</i> | ... | 356 |
| The Technical Efficiency of Sago and Starch Industry Cluster — <i>E. Bhaskaran</i> | ... | 377 |
| Measuring an Agro-Based Cluster's Productivity — <i>Anupam and Sunil Sharma</i> | ... | 391 |
| Promoting Agripreneurship through Cluster Development in Mizoram: An Analysis of Economics of Sericulture in Saitual Cluster — <i>Lalzuitluangi and Rama Ramswamy</i> | ... | 400 |
| Influence of Indian Automobile Industry in Modern Production Method: A Critical Review — <i>J. Venkatesh and Lavanya Kumari</i> | ... | 410 |
| A Model for Technology Diffusion Determines Productivity Distribution and Aggregate Growth — <i>Manoj Kumar</i> | ... | 420 |
| A Study of Occupational Stress and Workplace Spirituality in Himachal Pradesh Police — <i>Shyam Kaushal and Stuti Jalan</i> | ... | 434 |
| Stress at Work Place: A Study with Reference to Police Personnel of Gajapathi District, Odisha — <i>Kalyan Chakravarthy Parle</i> | ... | 443 |
| Financial Performance Analysis of Tata Consultancy Services Limited (A case study) — <i>Mala Rathi and Krishn Awatar Goyal</i> | ... | 452 |

Ecology & Economy Integrated Clustering Approaches for Sustainable Development in India

RAMACHANDRA T. V. AND SUBASH CHANDRAN M. D.

The concept of economic clustering and trade guilds in India has roots in pre-history. The cocoons and silk processing industry has traditionally existed in clusters, in places such as Banaras, Kancheepuram, Kashmir etc. Cluster-based economic development has become an increasingly popular topic for researchers and economic development professionals. The approach is considered an important aspect of a broader re-orientation of research and economic policy towards laying the foundations of a microeconomic approach for prosperity and growth. The past decades were under the spell of macroeconomics and the creation of market institutions in developing economies. While there is now a fairly broad consensus on the type of macroeconomic and legal conditions necessary to achieve economic progress, it is also becoming clearer that these conditions are not sufficient. As a new approach to help economies reap the full potential of an improved macroeconomic and legal context, cluster-based efforts have received a lot of attention. Clusters are groups of industries and institutions co-located in a specific geographic region (based on availability of natural resources) and linked by interdependencies in providing a related group of products and/or services. Because of the proximity among them—both in terms of geography and of activities—cluster constituents enjoy the economic benefits of several types of positive location-specific externalities.

This communication presents integrated clustering of villages for inclusive growth, promoting eco-friendly, local resources, local skill and manpower-based thematic developmental programmes through laying a stronger foundation for sustainable growth. Micro-finance and revival of village-centred enterprises and clustering of villages for thematic development programmes can greatly improve the financial and livelihood security of rural homes, and could provide the largest venues for women empowerment.

Ramachandra T.V., and Subash Chandran M.D, Energy & Wetlands Research Group, Environmental Information System, Centre for Ecological Sciences [CES], <http://ces.iisc.ernet.in/energy>, Indian Institute of Science, Bangalore, Karnataka, 560 012, India. ORCID: 0000-0001-5528-1565

1. Introduction

Cluster-based economic development approach aids in laying the foundations of a microeconomic approach for prosperity and growth at decentralized levels. Cluster-based efforts are emerging to help economies reap the full potential of an improved macroeconomic aspects (Ketels, 2003). Group of industries and institutions co-exist at a location based on the natural resources availability and enjoy the economic benefits of location-specific externalities.

The externalities include, for example, access to specialized human resources and suppliers, necessary knowledge base, a competitive atmosphere calling for higher performance, and learnings from the close interaction with specialized customers and suppliers (Ketels, 2003). Porter (2000) observed that in the age of globalization, economic geography involving clusters of entrepreneurs/service providers would look paradoxical. Changes in technology and location have diminished many of the traditional roles of location. Yet, clusters or geographic concentrations of interconnected companies (in the author's focus) were considered a striking feature of virtually every national, regional, state and metropolitan economy, especially in more advanced nations. Porter's work caused a surge of interest in clusters as drivers of economic growth and hubs of innovation.

Cluster refers to the agglomeration of small and medium enterprises (in the Indian context) in producing same/similar products/services, or, engaged in the same line of manufacturing activities or services, located within an identifiable and, as far as practicable, contiguous area. The cluster concept gained prominence as an economic policy tool aimed to foster innovation and growth of a competitive private sector in developing countries (Ittyerah,

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2009). Donors and development agencies have been paying attention to the potential of cluster initiatives to bring about pro-poor effects. Thriving clusters can generate employment, income and opportunities for the local community and become drivers of broad-based local economic development (UNIDO, 2010). In the last two decades, hundreds of cluster initiatives have been launched involving virtually all regions of the world, and their number is growing. Two-thirds of European Union countries have introduced the cluster approach in their innovation policy, while several European initiatives are based on the provision of incentives and funding to boost competitive territorial advantages (Oxford Research AS, 2008). Clusters are also a widespread phenomenon in developing economies and can display levels of dynamism and innovation similar to those in industrialized countries. The high-tech industry of Bangalore, India, the Chilean wine clusters and the Sialkot, Pakistan, surgical instruments cluster are few examples of many successful endeavours. These dynamic clusters have achieved high growth levels, gained a stable foothold in the international market and generated wealth and prosperity at the local level (UNIDO, 2010). Advantages of clustering are:

- i. Collective efficiency gains:* While the growth of individual small-scale firms is constrained by limited access to resources and inability to achieve scale and scope economies, firms within clusters benefit from collective efficiency gains, i.e. “the competitive advantage derived from local external economies and joint action” (Schmitz, H. 1997). External economies include the availability of a specialized labour force, machinery and input suppliers, the attraction of traders and buyers, as well as an industrial atmosphere where information and knowledge are easily shared. Therefore, cluster enterprises are able to achieve higher and sustained growth rates for synergies, and collaborative linkages allow them to pool resources and efforts for the achievement of shared economic goals. Collective efficiency gains can be further enhanced when the institutional and policy frameworks are responsive to the firms’ needs and supportive of their efforts (Bellandi, M. 2002). Cluster-based developmental path will also prevent migration of rural youth, provide job opportunity while practicing agriculture, improvements in the infrastructure, etc.
- ii. Spatial proximity effects:* The achievement of collective efficiency gains is facilitated by spatial

proximity such as among firms and local resources within clusters. Risk is decreased when firms know their partners and can easily gather information on their reliability. Firms have fewer incentives to engage in opportunistic behaviour since this will affect their future ability to acquire economic partners as well as attract social stigma. In general, proximity may facilitate the development of trust-based relations that lower transaction costs and support collaborative interactions (UNIDO, 2010).

- iii. Pro-poor growth and supports local people livelihood:* A cluster approach can be a valuable tool to tackle poverty and lay the ground for a process of broad-based growth. This is partly because clusters are also socio-economic systems where the population of firms overlaps with the community of people and their families, living and working in a delimited territory. Not only do entrepreneurs and workers share similar social, cultural and political backgrounds, but also norms of reciprocity and collective practices of self-help are common among employers and employees. Overall, this accounts for a distribution of the benefits of growth that is likely to be more inclusive than in other economic systems (UNIDO, 2010). However, still a considerable number of clusters in developing countries are lagging behind, trapped in a vicious circle of unrealistic competition. Although representing substantial pockets of entrepreneurial activities and providing a living to entrepreneurs and workers, when clusters are unable to shift from stagnation to growth, their potential to contribute to the development of local communities remains largely untapped (UNIDO, 2010).

2. Objectives

Objectives of the cluster-based local development approaches are: (i) consideration and scope for harvesting local skills (such as expertise in fishery, traditional handicrafts, wildlife trails and bird watching, etc.), (ii) upgrading skills to meet challenges (through greenskill development programmes, training programmes and awareness creation), (iii) identification of trainers and training institutes (to improve the skill base of clusters) and providing skills to match the needs of the cluster, (iv) generating economic opportunities for the poor: Promoting productive activities that facilitate fairer distribution of income than capital-intensive equipment; investing in

upgrading the skills and employability of marginalized segments such as women, migrants (Gowlis for eg.), forest tribes and castes, and encouraging the production of goods and services affordable by the poor. For the participation of the poor in the decision making, NGOs, village councils, women's federations and self-help groups will play key roles, (v) participatory approach: the adoption of a participatory approach, openly oriented at empowering the poor fringes of the society contributes to reducing their marginalization and encourages their active participation in the economic life of the cluster by improving their self-confidence and social status.

3. Economic Clustering in Ancient India

The concept of economic clustering and trade guilds in India has roots in pre-history. The cocoons and silk processing industry have traditionally existed in clusters, in places such as Banaras, Kancheepuram, Kashmir etc. In *Jataka*, Kasi was a principal centre of manufacturing cotton as well as silk in the 5th or 6th century B.C. Cotton clothes of Kasi were exquisitely woven, smooth, bleached completely white, and their fibres were fine and soft. Tradition says that when Buddha died, his remains purified with balm were wrapped with brand new cotton clothes of Kasi. Spinning and weaving of cotton was known to Harappans 5000 years ago. The Agarbatti industry had its traditional clustering in Mysore. Bidar became an important centre of alloy metal artworks, especially silver inlay on metals. Spice growing trade in general clustered along southwest India, particularly Calicut, Cochin, Nagarabastikeri, Banavasi etc. With the development of cities as industrial trade centres, various industries and enterprises clustered in the cities where different streets specialized in production or trading of different wares.

3.1 Collapse of agro-pastoral-cum-forestry clusters of central Western Ghats:

Pre-colonial land use system in central Western Ghats was characterized by shifting cultivation, secondary forests and savannah lands in hilly places, fairly large sized sacred groves (*kan* forests), and permanent cultivation in valleys. Whereas secondary forests were used for routine biomass needs, the sacred groves preserved climax forest biodiversity. There was regulated harvest of non-timber forest products (NTFPs) like pepper, cinnamon, *Caryota* (*Caryotaurens*) toddy, medicinal plants, edible fruits etc. from the *kan* forests. The *kan* forests were also the sources of perennial waters like streams, springs, ponds and lakes. These *kans* had prime role in recharging wells in the valley

downside. The landscape heterogeneity and the forests interspersed with grassy banks and savannahs favoured rich wildlife in the region. This traditional system of community-based landscape management suffered with the British claim over all forests including sacred groves and shifting of cultivation areas. The *kans* got merged with the rest of the reserved forests and lost their identity as sacred places. The locals were dependent on isolated *kans* in the middle of villages for firewood, leaf manure and other needs as they were not allowed access to such goods from timber-rich secondary forests. The Western Ghats Panel (2011) observed "serious deficit in environmental governance all over the Western Ghats tract" and urged that immediate steps be taken to address such issues. The Panel is impressed both by levels of environmental awareness and commitment of citizens towards the cause of the environment, and their helplessness in the face of their marginalization in the current system of governance.

3.2 Extraction pressures from forest-based industries

The 1940s witnessed escalating demands from forest-based industries such as plywood, matchwood, etc. on the forests of central Western Ghats. Dandeli Paper factory established in 1950s relied heavily on bamboo resources until almost near collapse of bamboo forests in Uttara Kannada. As choice timbers were being depleted in forests, even *kans* were not spared from industrial felling.

3.3 Community-based NTFP harvests replaced by contract system

The British, for the first time, started auctioning forest produce such as pepper, cinnamon, shikakai (soap nut powder), honey etc. to the contractors. The system of collection of NTFP by contractors was found to be very destructive to the forests, and the village communities were hard pressed for resources. In the recent decades, the move has been strengthening to give such NTFP collection rights to the Village Forest Councils (VFCs) and tribal co-operatives.

3.4 The hazards from monoculture plantations

Over-extraction of natural teak and the stoppage of shifting cultivation saw teak trees getting scarcer in Uttara Kannada. The British launched during the later parts of 19th century—systematic programmes to clear fell as much of natural forests—to raise teak plantations. The plantation activity became more vigorous after independence, and Eucalyptus and Australian Acacias were added to the

monocultures. Very often, these plantations were infested with weeds like Lantana and Eupatorium, suppressing the native vegetation. In the heavy rainfall areas especially, the replacement of natural forests with plantations, especially along hill slopes, caused severe soil erosion and drying up of perennial streams. Also, the reduction of diverse pollinators in the nearby localities has affected the crop productivities and hence the livelihood of people.

3.5 Impact of hydro-electric projects on ecology and livelihoods

Commissioning of the Linganamakki dam and Gersoppa dam for generation of hydro-electricity in Sharavathi River resulted in increased fresh water flow in the post-monsoon and summer months diluting the salinity in the estuary to nearly fresh water conditions (<0.5 ppt) most of the year. This caused serious collapse of the estuarine fisheries, both in diversity and quantity. Accordingly, fisheries-based livelihoods declined seriously in Sharavathi estuary and the bulk of estuarine anglers went elsewhere in search of jobs. The edible bivalve (clams and oysters) based fisheries also witnessed complete collapse. Mangroves are associated with very limited species that can survive in low brackish water conditions. Whereas the adjoining estuary of Aghanashini, which is not impacted by hydroelectric projects, has nearly 90 species of fishes, Sharavathi has hardly 50 per cent of this diversity. In the Kali estuary also, because of hydel projects upstream, fish diversity is much lower than in Aghanashini and edible bivalves shifted more towards the river mouth to a restricted zone.

3.6 The bane of estuarine shrimp aquaculture

Since early 1970s, intensive shrimp aquaculture started in Uttara Kannada estuaries with least regard for environmental norms. The traditional, salt-tolerant, Kaggarice-growing gazni fields were cut up and converted into shrimp ponds with almost irreversible consequences. The mangroves were totally cleared for creating many such farms. Monoculturing of shrimps with artificial feeds drastically cut down the sustainable production of a diverse variety of fishes from the gazni rice fields. Today, due to various reasons, aquaculture is on the decline but the estuarine ecology suffered seriously from this mega-venture. Moreover, with the contract system for fish catching from gaznis and shrimp aquaculture, the traditional estuarine fisher folks are restricted to the open parts of the estuary for fishing purposes bringing greater fishing pressure on the estuarine ecosystems.

4. Achieving sustainable development through cluster approaches

The original concept of sustainable development articulated in Our Common Future is of "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Some of the highlights of Principles of Ecologically Sustainable Development enunciated by Justice Brian Preston of Australia are: (http://www.lec.justice.nsw.gov.au/Documents/preston_principles%20of%20ecologically%20sustainable%20development.pdf):

- Effective integration of economic and environmental considerations in the decision-making process.
- Ecologically harmful cycle caused by economic development without regard to and at the cost of the environment could only be broken by integrating environmental concerns with economic goals. The Plan of Implementation of the World Summit on Sustainable Development held in Johannesburg, 2002, noted the need to "promote the integration of the three components of sustainable development—economic development, social development and environmental protection—as interdependent and mutually reinforcing pillars".
- The Precautionary Principle suggests that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

4.1 Application of sustainability principles for Uttara Kannada:

The ecological studies in Uttara Kannada during the course of last two and a half decades have created a sound database for the central Western Ghats-west coast region as a whole, enabling us to formulate an outline plan for decentralized, ecology-inclusive, low-risk sustainable development for bulk common good. The plan is in consonance with global trends in eco-friendly development for humid tropics. The highlights are stated below:

- i. Protection of the pristine environment wherever possible, demarcating areas involving biodiversity rich centres associated with forests, hydrologically significant areas such as Myristica swamps and high endemism forests, sacred groves, highly productive estuaries etc.

- ii. The development plans are inclusive, aimed at better livelihood opportunities for the locals, promote entrepreneurship at the grassroots involving even the most underdeveloped areas and marginalized people; at the same time, these plans are in spirit not to harm the fragile ecology of the district any further. Though there are no claims of zero ecological damage, simultaneous ecosystem enrichment is envisaged through apiculture, restoration of mangrove ecosystems, beach vegetation and bio-shielding, protection of Myristica swamps and relic climax forests, eco-friendly redesigning of village peripheral forests etc.
- iii. In the field of agriculture, the thrust is on organic farming, in situ conservation of indigenous crop varieties, cultivation of medicinal plants and their primary processing, marketing of organic products, crop insurance against damages from wildlife, agro-processing, value addition, use of locally produced bio-pesticides and bio-fertilizers etc.
- iv. A variety of low risk and low investment, and least polluting cottage and small-scale industries, mostly based on locally available or locally produced raw materials, and locally trained human-power are proposed. These are visualized taking into account global trends and sustainability. For instance, production of handmade goods or using low cost machinery and locally fostered human resources are going to reduce energy and transportation costs, and at the same time preventing mass migration of youth from impoverished villages into the cities, where burgeoning population and associated crises are turning out to be unsolvable for the Government. The fillip to growing of medicinal plants, apiculture, sericulture, preparation of vegetable dyes, scientifically prepared plant products like kokum (*Garcinia indica*) butter, coconut products, canned fruits, nutraceuticals, participatory ecotourism etc. are meant to capture the global market in the near future.
- v. In the energy sector, having researched on the silent but serious repercussions within the ecosystems of hydro-electric projects, (Sharavathi and Kali estuaries—for instance), adoption of widespread harnessing of solar energy will lead to integrated eco-development, apart from biogas, energy efficient stoves, biofuel etc.
- vi. The high importance given to fodder farms at panchayat levels is based on the finding of fodder scarcity and prohibitive price of other cattle feeds. The tendency of the people to do away with cattle is primarily because of increased expenses on maintaining them. The reduced availability of cattle manure will tell upon soil fertility and soil structure badly and undermine agricultural systems. Fodder farm is a simple low cost solution for livestock maintenance, achieving prosperity through dairying and for greater soil fertility and protection.
- vii. Alternate sustainable use of crop residues for bioethanol, etc. would minimize the greenhouse gas hazards associated with the crop residue, and more importantly, gives an opportunity to the local youth to setup biofuel manufacturing units.

Clustering approaches for ecology-integrated sustainable development of Uttara Kannada has been suggested after due consultations with the stakeholders covering all sections of the society.

5. Ecology-integrated clustering for development of local bodies

The geographical clustering approach for integrated, ecologically-sound development seems to be the only solution for sustainability in rural India, a country which is still a fair mix of advanced state of biotechnology, IT industry and global leaders in textile production, iron and steel, and transportation co-existing with slash and burn cultivation in the North-East, handmade clothes, village blacksmiths, bullock carts and stone-age canoes. The integrated eco-cluster approach, recommended here for Uttara Kannada district, is meant to protect ecology, biodiversity, water resources, culture and traditions while paving way for locality-specific economic development, primarily aimed at elevating the levels of livelihood security. Such development is meant to counter the adverse impacts of globalization on environment and human life in this fragile, humid, tropical zone rich in biodiversity, both cultivated and wild, and to arrest the recent trends in mass migration of youth deserting their villages, seeking better livelihoods in big cities. The clustering of gram panchayats, including small towns, for carrying out a proposed set of economic activities per cluster, envisaged here, is the best alternative to mega-projects and macro-economic development for a fragile tropical zone, a part of the Western Ghats, one among 36 Global Biodiversity Hotspots (<https://www.conservation.org/priorities/>)

biodiversity-hotspots). As cities like Bangalore are becoming unliveable due to unplanned urbanization (1028 per cent increase in paved surfaces with 88 per cent decline in vegetation cover and 79 per cent reduction in local water bodies, leading to severe scarcity of water and oxygen) with the burgeoning population and chaotic development, with water and power crisis looming large, rising pollution and scanty living spaces, the strains are felt in the Western Ghats for siphoning of water, producing hydro-power and even thermal and nuclear power, and extracting diverse kinds of natural raw materials, endangering ecology and impoverishing rural life, making the youth migrate in large numbers deserting their rural homes and leaving behind their traditional livelihoods.

6. Cluster development approach for Uttara Kannada

Sector-wise cluster development approach is inherent and is gaining importance in Karnataka. For instance, in the field of crop production, Bangalore urban and Rural, Kolar and Tumkur constitute a mango cluster targeting production of export-quality mangoes. Dakshina Kannada, Udupi, Uttara Kannada and Kolar make a cashew cluster. Most of the Malnadu districts of the state belong to a cocoa cluster and so on. An all sector-integrated, ecology-based cluster approach is lacking so far.

A taluk-wise clustering of Uttara Kannada has been proposed in Figure 1 for the ecology-integrated sustainable development. In each taluk, the taluk headquarter along with adjoining gram panchayats will constitute one cluster. The coastal gram panchayats are grouped into coastal clusters (Figure 2.1) in view of their proximity to sea, marine fishing as a form major livelihood, their threats from sea level rise and sea erosion in future, nearness or inclusion of estuaries and creeks—which themselves are highly productive ecosystems, low, hilly lateritic terrain, the possible compacted deposits of ancient Gondwana Land erosion, with specialized ecosystems and so on. The inner coastal panchayats bordering on Western Ghats are grouped into separate clusters. If major west-flowing rivers intervene in the landscape, the gram panchayats on either sides are grouped into separate clusters (Figure 2.2). In the Malnadu taluks, the eastern relatively drier gram panchayats and western ones along the crest of the Western Ghats—clad in mainly evergreen forests—make separate clusters. The Anshi-Dandeli Tiger Reserve—including Anshi National Park and Dandeli Wildlife Sanctuary—along with associated villages, constitute one cluster (Figure 2.2). In this cluster, developmental activities

are primarily related to eco-tourism and the associated areas, considering the sensitivity of the conservation area. In Mundgod and Haliyal, the taluks merging with the Deccan zone (Figure 2.3), the GPs of relatively flatter eastern portions having numerous ponds and lakes are brought in clusters, separated from those bordering Malnadu forests. Development activities are proposed considering the terrain, landscape elements, ecology, farming systems, associated human life etc. The resulting clusters form self-reinforcing networks of local industries, research institutions, universities, financial bodies and public sector organizations characterized by a high level of competition and collaboration.

6.1 Cluster facilitators and need for institutional structure for implementation

Village panchayats form ideal units for implementation of cluster approach for integrated eco-friendly development. The success of cluster-based development programmes will depend on the active participation of facilitators. The various government departments, financial institutions and NGOs will have active roles to play in the success of the integrated cluster-based approach. In addition, there is also need for district- and taluk-level facilitator committees for scrutinization of developmental plans and review of progress achieved. The role of some facilitators, for instance, is indicated below.

6.2 Forest and wildlife departments

As forests constitute a major asset of the district, the Forest department needs to be strengthened with more workforce. With regards to development of nurseries, local people need to be involved and are to be encouraged and guided to make nurseries of forest trees and medicinal plants (*Coscinium fenestratum*, *Nothapodytes nimmoniana*, *Asparagus racemosus*, *Embllica officinalis*, *Saraca indica*, *Terminalia bellirica*, *Adhatoda vasica*, *Rauwolfia serpentina*, *Tinospora cordifolia* etc). It is suggested to look into the feasibility of purchase of medicinal plants or their products by the Forest Department, or by the local VFCs, from the producers at fair prices and also the sale/supply of these goods to pharmaceutical companies are to be undertaken by the Forest Department itself. This recommendation is being made to stop rampant illegal collection and trade of medicinal plants from the wild. The local ayurvedic pharmaceuticals (within the district) and local people are to be engaged in the cultivation, and value addition to medicinal plants be supplied with medicinal plants/products on priority basis to enrich the local economy and employment potential.

6.3 NTFP collection, developing beekeeping involving forests and mangroves and value addition

Contract system for collection of NTFP from forests found to be highly detrimental to forests and biodiversity and economic well-being of local people be stopped forthwith and co-management system involving local people be adopted. Production of bamboo-based products by local craftsman and effective utilization of bamboo for local development is important. As beekeeping is recommended as an important activity for almost all clusters, roadsides, common lands, under-stocked or degraded forest patches around villages are to be planted with appropriate nectar plant species. Use of alternative energy sources replacing firewood. Development of bettas (minor forests) for tree farming, medicinal plants and fodder. Promoting backwater, mangrove, beach tourism, development of rural tourism and home stays in the vicinity of forests and wildlife areas. Regular conduct of training in bird watching, wildlife studies, trekking trails, hygiene and solid waste management involving VFCs, local youth in forest and wildlife related tourism areas be arranged with view of generating eco-friendly employment potential. Utilization of weeds and harvestable trees/tree parts, bamboos, canes etc., from plantations or other designated areas for vegetable dyes, medicines, weaving, furniture, handmade paper, sports goods production. Awareness creation and conservation of sacred groves, sacred *kans*, which are biodiversity-and hydrology-significant areas and still playing unique cultural roles in rural society. All hydrologically significant forest patches, as indicated, for instance, by high Western Ghats endemism among trees, be preserved both for the sake of perenniality (i.e. 12 months water availability) of water courses and for their biodiversity content. The Department to consider pooling back good part of income from VFC-managed areas into sustainable income generating activities in the cluster level.

6.4 District Industries Centre (DIC)

Main focus agency for promotion of small scale and cottage industries, which include easy registration of small scale and cottage industries, infrastructure assistance, investment subsidies, linking with the employment generation programmes, entrepreneurship development programmes, technical training, assisting in sale of products, buyer-seller meets and not allowing polluting (new red and orange category) industries in Malnadu and coastal taluks. Orange category may be considered under strict norms and social audit, away from biodiversity centres.

6.5 Tourism department

Integrated community-based eco-tourism development is being conceptualized to benefit some clusters of adjoining local self-government units as a strategy to address high incidence of poverty among the communities, while such areas are teeming with tourism potential. This includes developing integrated community-based eco-tourism, assistance in building aesthetic cottages/rooms as part of home stays of bonafide locals or local VFCs. Local grass root level tourism related enterprises to be preferred against construction and commercial lobby, developing tourism awareness in the appropriate panchayat clusters. Conducting programmes on safeguarding local cultures, performing arts and biodiversity. Providing necessary registration/licenses for village home stays (managed by individuals/VFCs/communities) and requires to publish details of homestays in the government portals. Training youth in tourism/home stay management and fostering tourism related entrepreneurship among the local people to increase self-employment opportunities in rural areas and small towns.

6.6 Horticulture department

The responsibilities include facilitate farming of desired crops only under insurance coverage, training women in preservation of fruits and vegetables, and promoting organic cultivation for exports and Indian markets.

6.7 Financial institutions

Government financing and micro-financing institutions to step in to promote cluster-level development programmes through local panchayats, VFCs, Biodiversity Management Committees (BMCs), NGOs, departments, societies etc. Financing from charitable and voluntary organizations, and NGOs and not-for-profit financiers to be considered and may be recommended by related departments. Crop insurance, preferably, in identified human-wildlife conflict zone is highly necessary for future of biodiversity conservation. Financial literacy is very critical for the envisaged participatory development programmes.

6.8 Mining and Geology

Mining in the ecologically fragile regions such as Western Ghats to be phased out. Mining for building stones/jelly be limited to meet local demands, and in any case, not to be transported out of the district. Sand mining in the rivers and estuaries is to be limited strictly for use within the district. Considering coastal laterite as Gondwana land soil/rock deposit, and its limited nature, its special

ecosystem value sustaining rare and unique biodiversity, laterite quarrying from coastal hills should be limited to meeting local demands. Laterite transport to outside the district is to be banned. Mining of stones/sand/shell etc. from VFC/BMC jurisdiction areas be limited to local use and, in any case, not to be transported outside local area/district as is deemed fit by the joint decision of VFC-BMC and Forest and Mining-Geology departments.

6.9 Education department (Primary and Secondary):

The environment education initiatives with high school students and teachers show they are effective in documenting many aspects of biodiversity and related knowledge existing at village level. Within a reasonable time, say one or two days spent on motivating and familiarizing them with the concepts of biodiversity documentation and data collection formats, they could contribute substantially towards building up a dynamic database at village-level that is ready for integration into the People's Biodiversity Registers (PBRs). They are more effective in meeting and interviewing organic farmers, in noting down details on traditional cultivars, collecting details on sacred groves, major wildlife related details etc.

6.10 District administration/Zilla panchayat:

Thin plastic carry bags production and sale to be banned, to promote locally-produced cloth and paper bags. Hoteliers and bulk purchasers of milk to purchase milk in larger containers, which the milk producers are to use mandatorily and need-based. Use of plastic disposable cups and plates to be banned to reduce environmental hazards and to provide market for locally produced biodegradable eco-friendly materials made up of say areca-spathe or washable utensils. Government institutions, offices, public sector undertakings, educational institutions, temples, hoteliers and roadside eateries, and bulk caterers have to comply with such norms. Imposition of fines/cleaning charges be levied on polluters at all levels. Toilet facilities, within the reach of every household, are to be provided. Villages where open defecation is preferred, Zilla panchayats should introduce eco-friendly community sanitation facilities.

7. Conclusion

Cluster-based development approaches are easily implementable at decentralized levels, which constitute a vital path for a broader re-orientation of research and economic policy towards laying the foundations of a microeconomic approach for prosperity and growth. A

taluk-wise clustering of Uttara Kannada considering the taluk headquarter along with adjoining gram panchayats as one cluster. The study highlights that the coastal gram panchayats grouped into coastal clusters forms highly productive ecosystems, with the decentralized job opportunities in fisheries, fish products processing, etc. The inner coastal panchayats bordering on Western Ghats are grouped into separate clusters. The Malnadu taluks, clad in mainly evergreen forests, make separate clusters and provide opportunities for forest-based food-processing clusters. In Mundgod and Haliyal, the taluks merging with the Deccan zone, the GPs of relatively flatter eastern portions having numerous ponds and lakes are brought in clusters, separate from those bordering Malnadu forests. Development activities have been proposed for each cluster considering the terrain, landscape elements, ecology, farming systems, natural resources available, associated human life, etc. The resulting clusters form self-reinforcing networks of local industries, research institutions, universities, financial bodies and public sector organisations characterized by high level of competition and collaboration. Thus, cluster-based local development approaches help in harvesting local skills (such as expertise in fishery, traditional handicrafts, wildlife trails and bird watching, etc.), upgrading skills to meet challenges, identification of trainers and training institutes (to improve the skill base of clusters) and providing skills to match the needs of the cluster, while generating economic opportunities for the economically backward section of the society.

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We are grateful to (i) ENVIS Division, the Ministry of Environment, Forests and Climate Change, Government of India (grant: CES/TVR/DE007), (ii) UNSD, The Ministry of Statistics and Programme Implementation, Gol, and (iii) Indian Institute of Science (IISc/R1011) for the financial and infrastructure support. We acknowledge the support of (Karnataka) Forest Department for giving necessary permissions to undertake ecological research in Central Western Ghats. We thank Prakash Mesta, Vishnu Mukri and Srikanth Naik for their assistance during field data collection and spatial layer generation.

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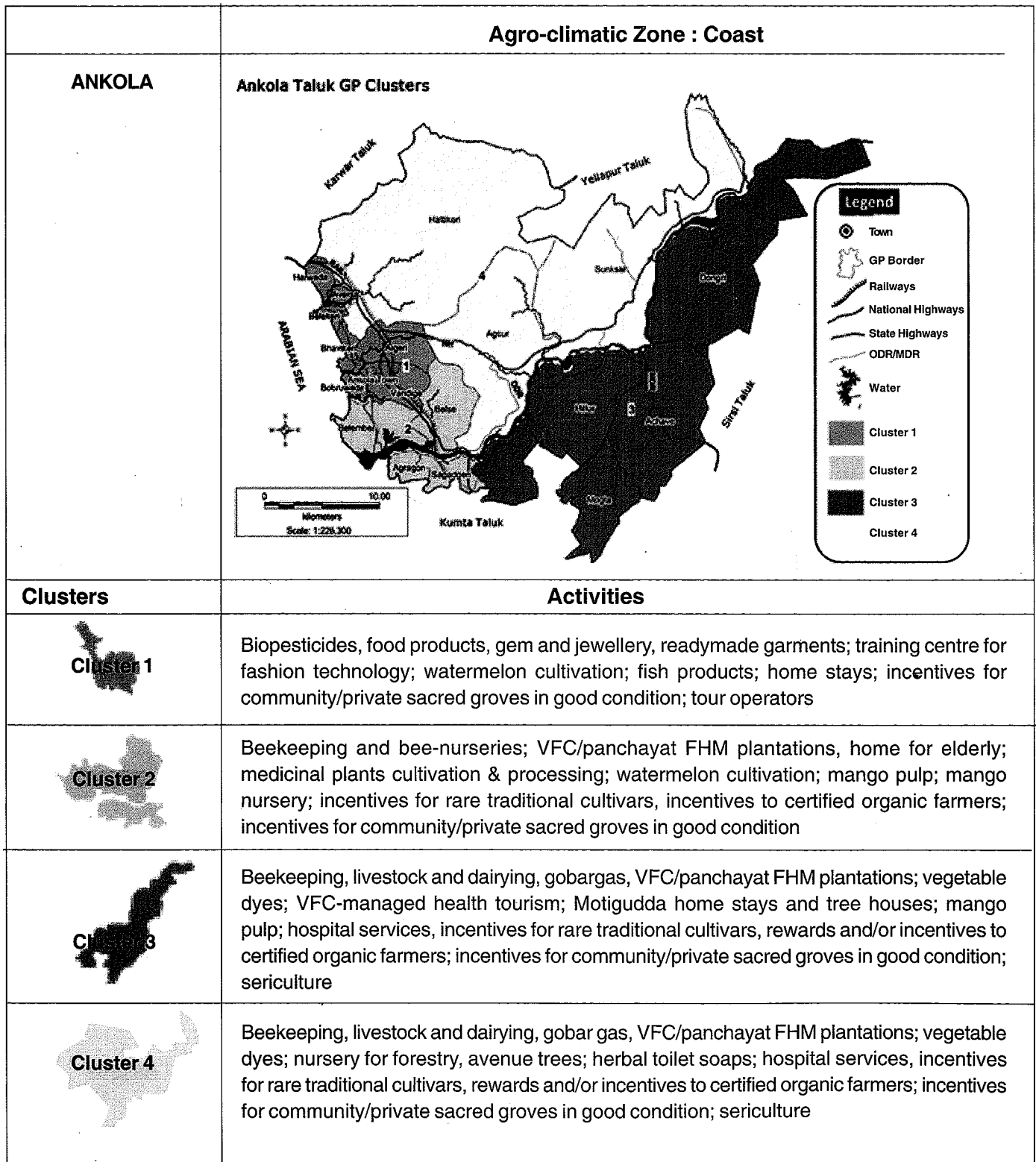
"Economic clusters and conventions have become synergistic"

– Tom Clark



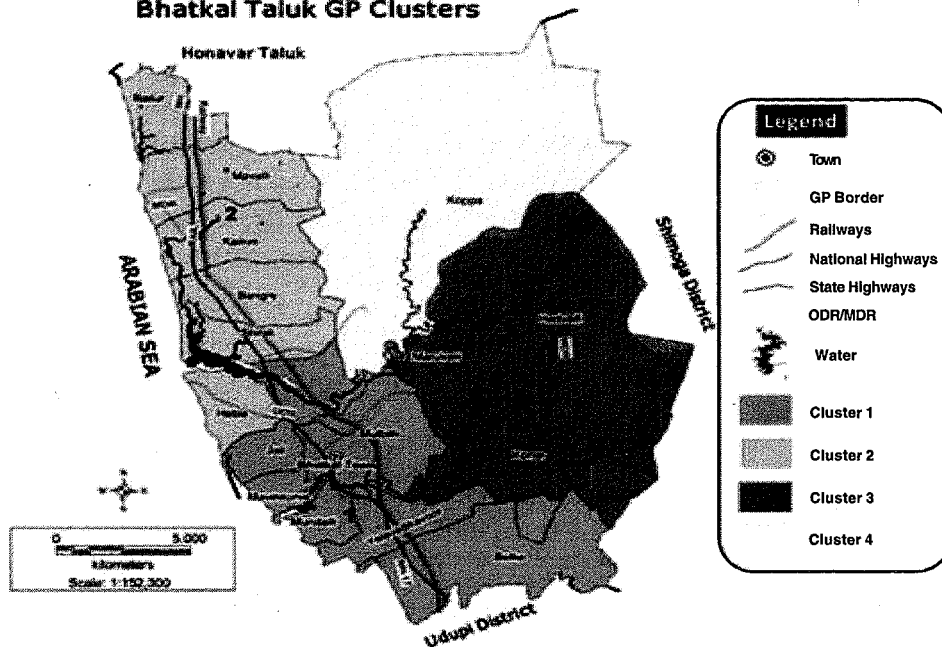
Figure 1: Cluster-based developmental approaches for Uttara Kannada district





Figure 2.1: Clusters for taluks in the Coastal agro-climatic zone



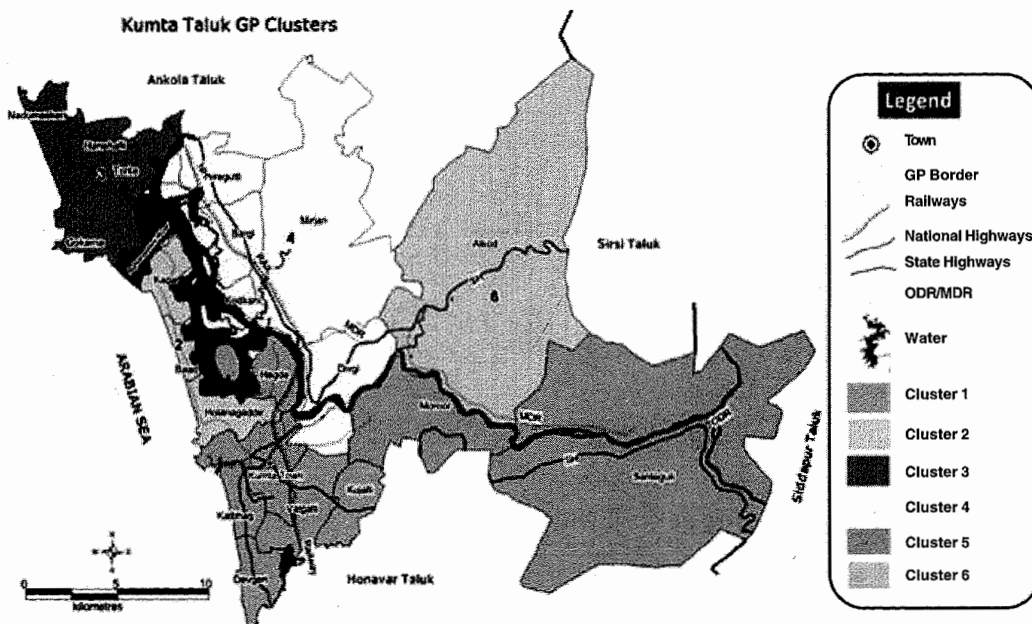
BHATKAL





Bhatkal Taluk GP Clusters





| Clusters | Activities |
|---|--|
|  <p>Cluster 1</p> | <p>Beekeeping, VFC/panchayat FHM plantations, home for elderly; vegetable dyes, readymade garments; jasmine cultivation, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |
|  <p>Cluster 2</p> | <p>VFC/panchayat FHM plantations; biopesticides and bio-fertilizers; VFC/individuals managed home stay tourism, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 3</p> | <p>Beekeeping, livestock and dairying, gobargas, VFC/panchayat FHM plantations; medicinal plants cultivation and processing; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 4</p> | <p>Beekeeping and bee nurseries; livestock and dairying, gobargas, VFC/panchayat FHM plantations; vegetable dyes; herbal toilet soaps, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; VFC-managed home stay tourism</p> |

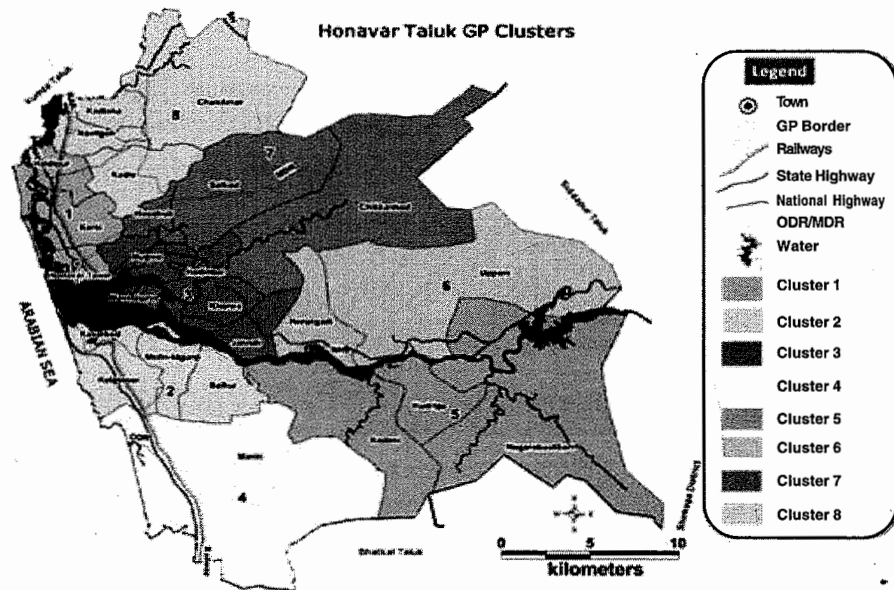
KUMTA











| Clusters | Activities |
|---|--|
|  <p>Cluster 1</p> | <p>Vegetable dyes; Coconut products (virgin coconut oil; purified oil; spray-dried coconut milk powder, desiccated coconut, coconut vinegar), hand-made paper; cloth and paper bags; wood carving; metal inlaid wood carving; training centre for handicrafts; jewellery development and training centre; organic lime industry; Alvekodi onion expansion and storage, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |
|  <p>Cluster 2</p> | <p>Dry fish, marine algae products; coastal home stay tourism; training in tourism management; training in making palm-bamboo cottages; training in stone carving; Pandanus leaf products; Integrated, participatory planning and management of Aghanashini estuary; bio-shielding and turtle conservation programmes; bivalve processing and canning; Aghanashini Biodiversity Heritage site management; bivalve shell mining to be reviewed; sand mining to sustainable limits, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 3</p> | <p>Vegetable dyes; home stay tourism; iodized salt, confectionery, bakery; bakery training centre for women; beekeeping; training centre for beekeeping; arts and handicrafts museum and trade centre; sale of organic products; certified organic eateries, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |
|  <p>Cluster 4</p> | <p>Beekeeping, VFC/panchayat FHM plantations, home for elderly; cloth and paper carry bags; mangrove study tourism, bird watching and sport fishing; estuary interpretation centre, VFC-run estuarine holiday home; fish breeding area cum mangrove conservation (VFC-managed); mangrove diversity area (various mangrove species and associates to be grown); estuarine crab fattening area; integrated, participatory planning and management of Aghanashini estuary; sand mining to sustainable limits, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; sericulture</p> |

| | |
|---|--|
|  <p>Cluster 5</p> | <p>Beekeeping, livestock and dairying, gobar gas, VFC/panchayat FHM plantations; poultry, poultry feed, powdered eggs, vegetable dyes, kokum products, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; sericulture</p> |
|  <p>Cluster 6</p> | <p>Beekeeping, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, vegetable dyes, medicinal plants cultivation and processing; pickles from wild berries etc; cane and palm leaf products; VFC-managed holiday home palm houses; Yana trekking and bird watching; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |

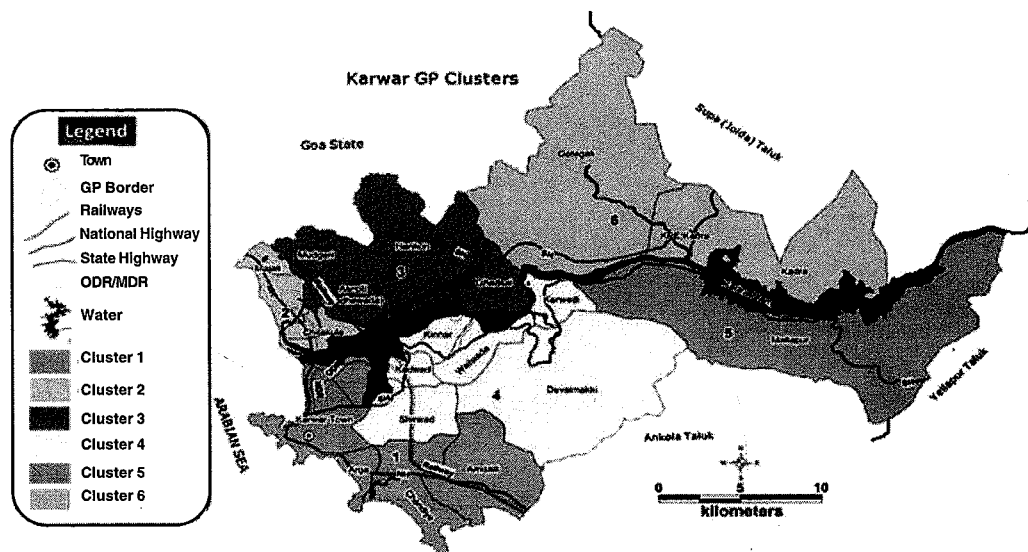
HONNAVAR



| Clusters | Activities |
|---|---|
|  <p>Cluster 1</p> | <p>VFC/panchayat FHM plantations; organic products certification; honey testing lab; medicinal plants cultivation & processing; organic coconut hair oil; coconut oil natural soap; Calophyllum inophyllum cultivation and biodiesel; wood carving; metal inlaid wood crafts, incentives to certified organic farmers; tour operators</p> |
|  <p>Cluster 2</p> | <p>Beekeeping, VFC/panchayat FHM plantations, dry fish, home stay tourism; academy for Yakshagana and performing arts; Calophyllum inophyllum cultivation, incentives for rare traditional cultivars, incentives to certified organic farmers; cloth and paper bags</p> |
|  <p>Cluster 3</p> | <p>Beekeeping, VFC/panchayat FHM plantations; cattle feed; coir products; training centre for coir products; backwater tours in native crafts; river front home stays, incentives for rare traditional cultivars; incentives for certified organic farmers</p> |
|  <p>Cluster 4</p> | <p>Coastal home stay tourism; training in making palm-bamboo cottages; Beekeeping, VFC/panchayat FHM plantations; Calophyllum inophyllum cultivation, incentives for rare traditional cultivar, incentives for certified organic farmers;</p> |
|  <p>Cluster 5</p> | <p>Beekeeping, VFC/panchayat FHM plantations; woodland holiday homes of bamboo and palms; trekking trail to Govardhanagiri (Kanur fort) and bird watching; hospital services, incentives for rare traditional cultivars, incentives for certified organic farmers; areca-spathe products</p> |

| | |
|---|---|
|  Cluster 6 | Beekeeping, livestock and dairying, gobar gas, VFC/panchayat FHM plantations; vegetable dyes; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers |
|  Cluster 7 | Beekeeping, livestock and dairying, gobar gas, VFC/panchayat FHM plantations; vegetable dyes; cane and palm leaf products; hospital services, incentives for rare traditional cultivars, incentives for certified organic farmers |
|  Cluster 8 | Beekeeping, VFC/panchayat FHM plantations; vegetable dyes; medicinal plants cultivation & processing, incentives for rare traditional cultivars, incentives for certified organic farmers |

KARWAR









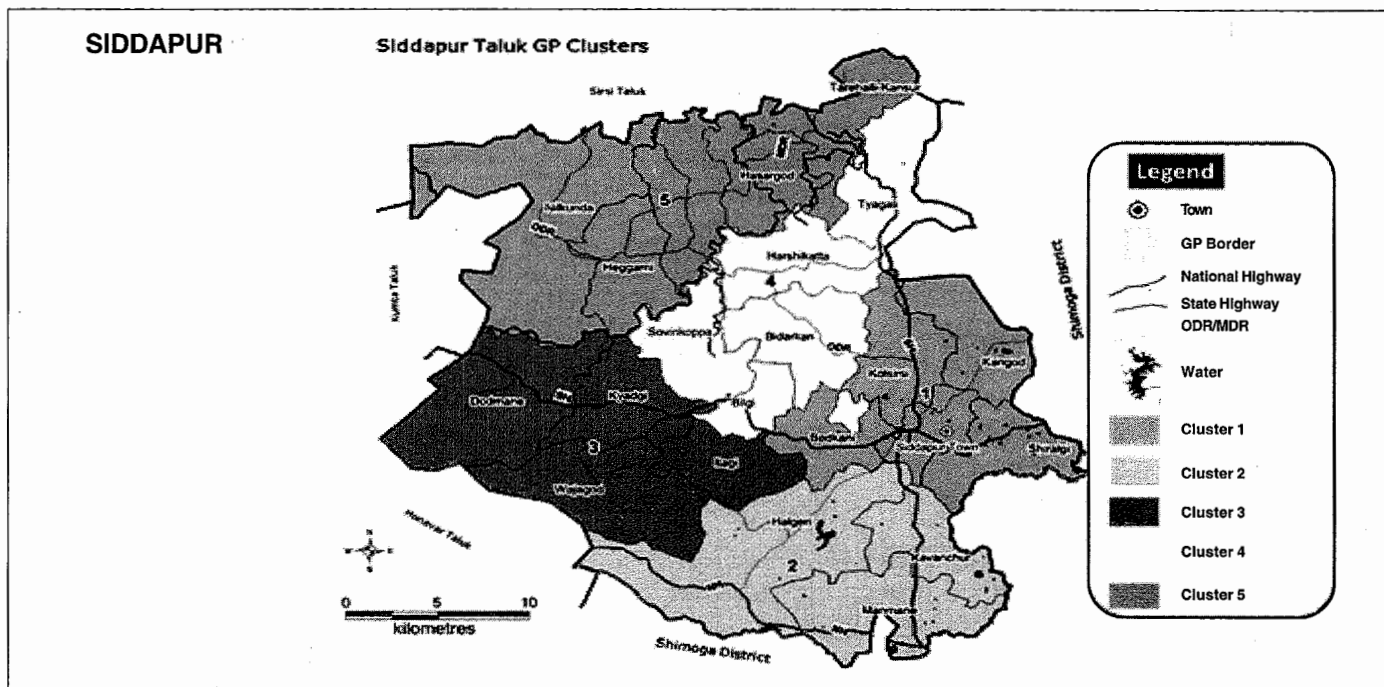
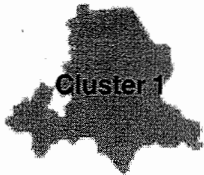




| Clusters | Activities |
|---|--|
|  Cluster 1 | IT-related development; vegetable dyes; medicinal plants cultivation & processing; gems and jewellery, ornament designing centre, Tulsi cultivation and extracts; integrated participatory management of Kali estuary; tour operators |
|  Cluster 2 | Dry fish; coastal home stay tourism; training in making palm cottages; medicinal plants cultivation; Noni cultivation; Tulsi cultivation and extracts; integrated participatory management of Kali estuary; cloth and paper bags; turtle conservation |
|  Cluster 3 | Beekeeping, VFC/panchayat FHM plantations, home for elderly; coir products; backwater tours in native crafts; river front home stays; integrated participatory management of Kali estuary, incentives for rare traditional cultivars, incentives for certified organic farmers |
|  Cluster 4 | Beekeeping, VFC/panchayat FHM plantations; medicinal plants cultivation & processing; coir products; hospital services; integrated participatory management of Kali estuary, incentives for rare traditional cultivars, incentives for certified organic farmers |
|  Cluster 5 | Beekeeping, livestock and dairying, gobar gas, VFC/panchayat FHM plantations; vegetable dyes, incentives for rare traditional cultivars, incentives for certified organic farmers; sericulture |
|  Cluster 6 | Beekeeping, livestock and dairying, gobar gas, VFC/panchayat FHM plantations; vegetable dyes, incentives for rare traditional cultivars, incentives for certified organic farmers; areca-spathe products; sericulture |

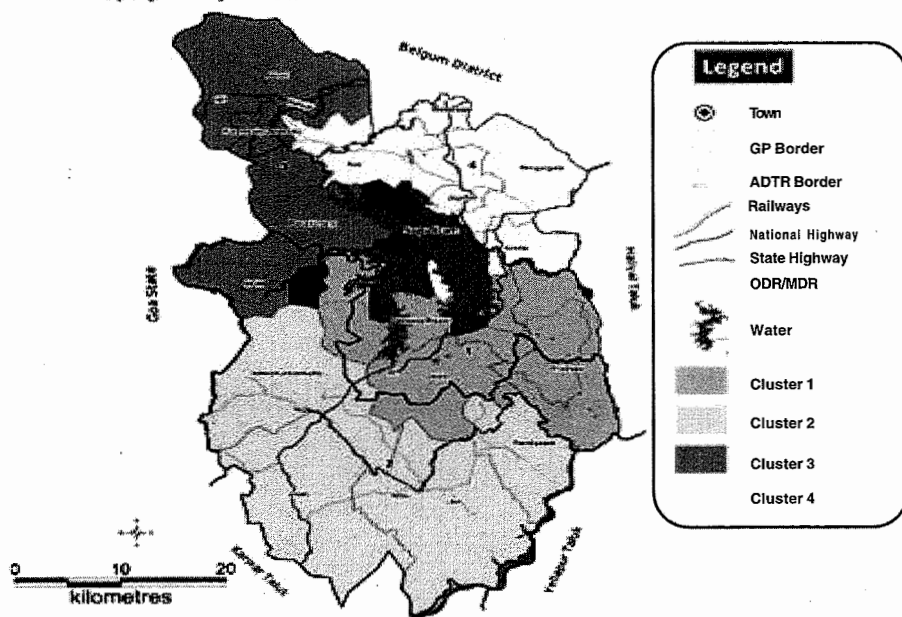
Figure 2.2: Clusters for taluks in the hilly agro-climatic zone

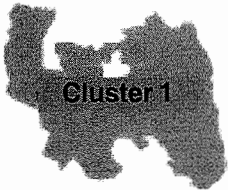
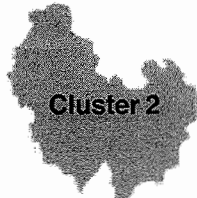

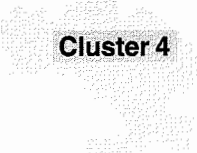


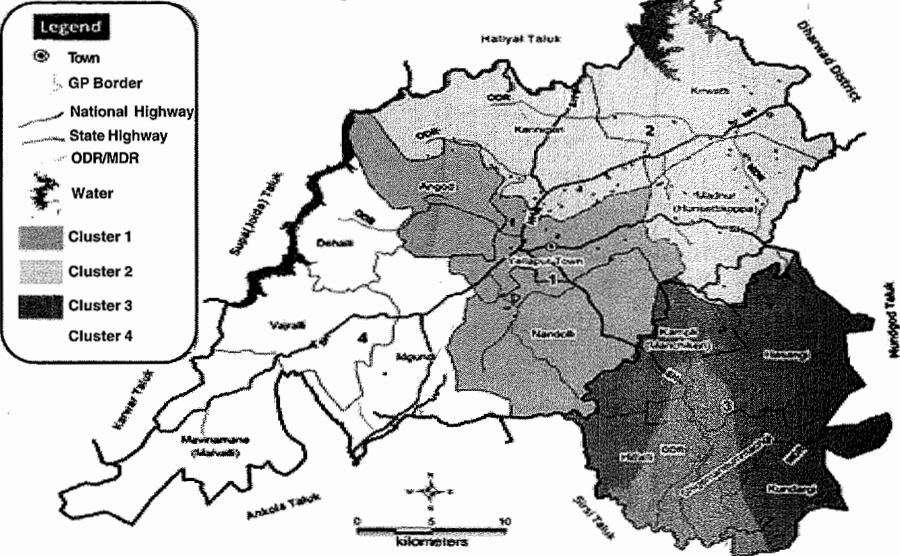
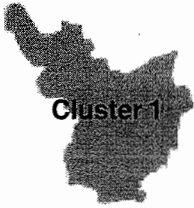
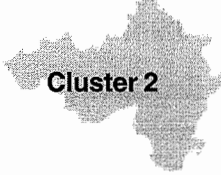


| Clusters | Activities |
|---|---|
|  <p>Cluster 1</p> | <p>VFC/panchayat FHM plantations, sericulture, home for elderly; organic products certification; microwave assisted hot air and vacuum drying of food & spices, ayurvedic medicines; sun-dried fruits and vegetables; training centre for beekeeping and honey testing lab, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |
|  <p>Cluster 2</p> | <p>Beekeeping and bee nurseries; livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; vegetable dyes; palm sugar; aromatic plants and essential oil distillation; orchids and cut flowers, indoor plants, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; cloth and paper bags</p> |
|  <p>Cluster 3</p> | <p>Beekeeping, VFC/panchayat FHM plantations; medicinal plants cultivation & processing; handmade paper products; palm sugar; aromatic plants and essential oil distillation; wild mango pickles; orchids and cut flowers, indoor plants; home-made organic chocolates; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; VFC/individual managed home stay tourism</p> |
|  <p>Cluster 4</p> | <p>Beekeeping, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; vegetable dyes; fruits and vegetables preservation; wild mango pickles; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 5</p> | <p>Beekeeping, VFC/panchayat FHM plantations; indoor plants and orchids; medicinal plants cultivation and processing; organic village home stay tourism; handmade paper products; palm sugar; wild mango pickles; home-made organic chocolates; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |

SUPA (JOIDA)

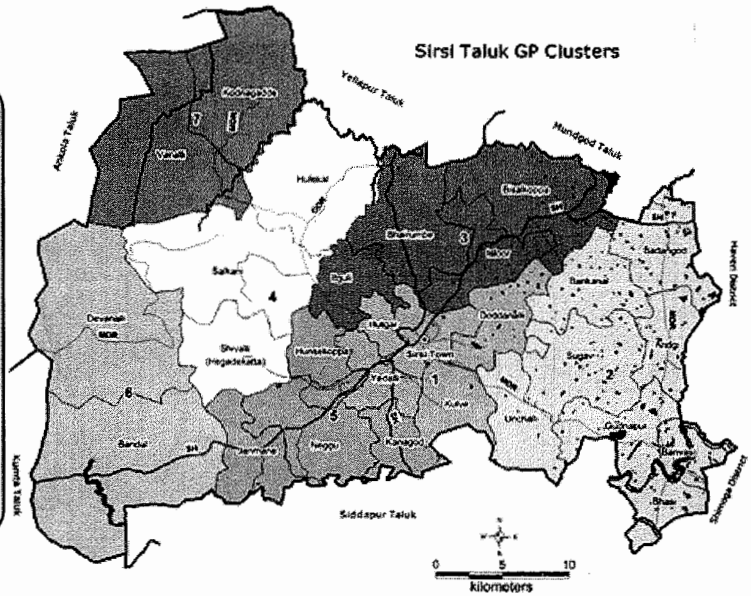
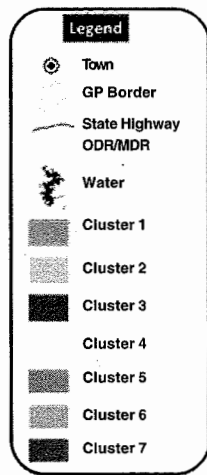
Supa(Joida) Taluk GP Clusters



| Clusters | Activities |
|---|---|
|  <p>Cluster 1</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; vegetable dyes; handmade paper; cloth and paper bags; sports goods-making; leather products; computer training centre; weaving with palm leaves, cane and bamboo works; training in making bamboo products; Pandanus leaf products; trekking and bird watching to Sintheri Rocks and Kavala caves, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |
|  <p>Cluster 2</p> | <p>Beekeeping, organic and forest honey sales, medicinal plants cultivation and processing; VFC-managed home stay tourism; wildlife tourism Anshi National park; Ulavi pilgrimage; tourist cottages in Ulavi; training in tourism management; VFC-managed holiday home bamboo cottages; pickles from wild berries; Tulsi cultivation and extracts; bamboo mat painting; incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 3</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations; vegetable dyes; water-sports training; VFC-managed home stay tourism in forest villages; holiday home bamboo cottages; monsoon trail to Dudhsagar Falls; aromatic plants and essential oil distillation; orchids and cut flowers; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 4</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; vegetable dyes; nursery for forestry and avenue trees; bamboo products; orchids and cut flowers; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; VFC/individual managed holiday homes</p> |

| YELLAPUR | <p style="text-align: center;">Yellapur Taluk GP Clusters</p>  |
|---|---|
| Clusters | Activities |
|  <p style="text-align: center;">Cluster 1</p> | <p>Beekeeping, training centre for beekeeping; forest honey; honey testing lab; livestock and dairying, gohar gas, VFC/panchayat FHM plantations, home for elderly; handloom units; VFC/individual run home stay tourism; holiday home bamboo-palm cottages; training in making bamboo-palm cottages; Pongamia plantations and biodiesel unit, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |
|  <p style="text-align: center;">Cluster 2</p> | <p>Beekeeping, fish farming, VFC/panchayat FHM plantations, sericulture; vegetable dyes; bamboo products; Pongamia plantations; aromatic plants and essential oil distillation, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; cloth and paper bags</p> |
|  <p style="text-align: center;">Cluster 3</p> | <p>Beekeeping, livestock and dairying, gohar gas, VFC/panchayat FHM plantations, sericulture; Pongamia plantations; desiccated banana, jackfruit, papaya etc., incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p style="text-align: center;">Cluster 4</p> | <p>Beekeeping and honey certification; livestock and dairying, gohar gas, VFC/panchayat FHM plantations; vegetable dyes; medicinal plants cultivation & processing; home stay tourism; orchids and cut flowers; home-made organic chocolates; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |

SIRSI







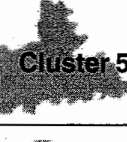


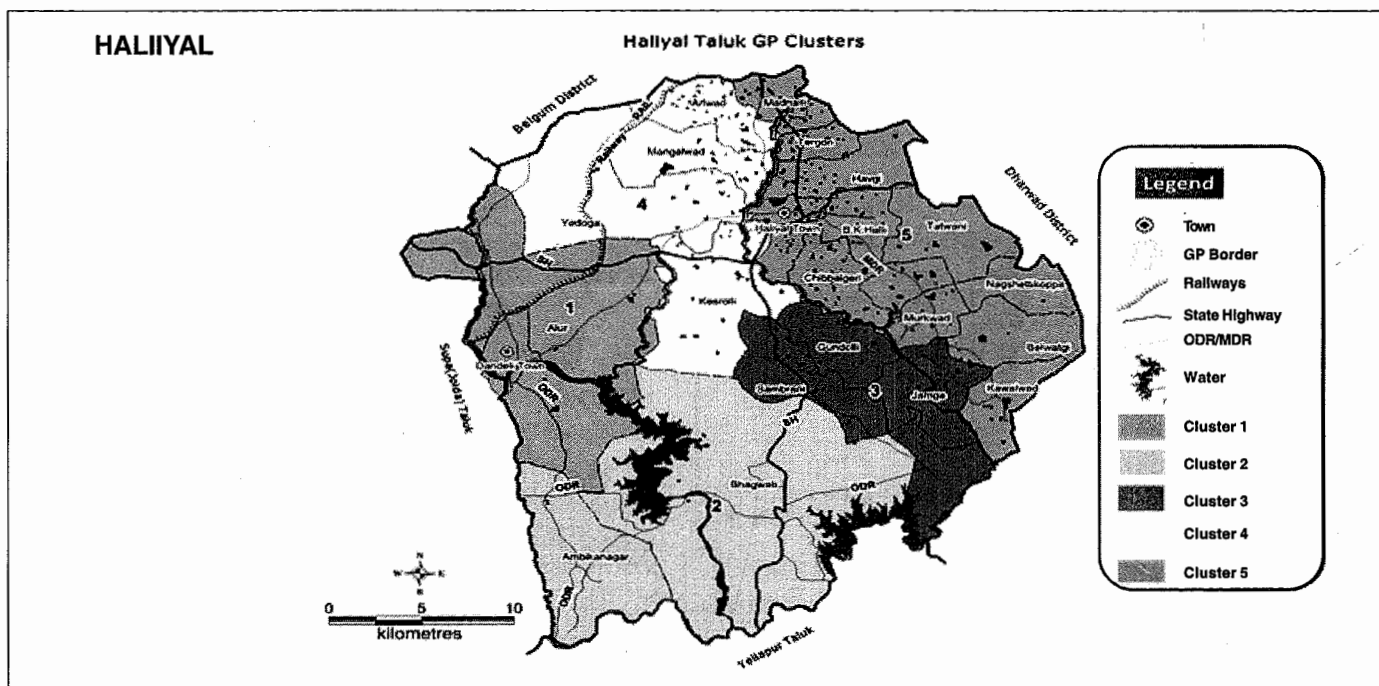





| Clusters | Activities |
|---|--|
|  <p>Cluster 1</p> | <p>IT-related activities, livestock and dairying, gohar gas, fish farming, home for elderly; vegetable dyes, food products; entrepreneur development institutes; incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |
|  <p>Cluster 2</p> | <p>Beekeeping, fish farming, livestock and dairying, gohar gas, VFC/panchayat FHM plantations, sericulture; mulberry nursery; sericulture training institutes; home stay tourism; hybrid seeds, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 3</p> | <p>Beekeeping, fish farming, livestock and dairying, gohar gas, VFC/panchayat FHM plantations, sericulture; hybrid seeds, incentives for rare traditional cultivars; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 4</p> | <p>Beekeeping, livestock and dairying, gohar gas, VFC/panchayat FHM plantations; aromatic plants and essential oil distillation; medicinal plants and processing units; home-made organic chocolates, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 5</p> | <p>Beekeeping, VFC/panchayat FHM plantations, incentives for rare traditional cultivars, incentives to certified organic farmers, incentives for community/private sacred groves in good condition; cloth and paper bags</p> |
|  <p>Cluster 6</p> | <p>Beekeeping, VFC/panchayat FHM plantations; vegetable dyes; medicinal plant cultivation and processing; holiday home woodland cottages; orchids and cut flowers; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 7</p> | <p>Beekeeping, VFC/panchayat FHM plantations; vegetable dyes; orchids and cut flowers; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; areca products</p> |

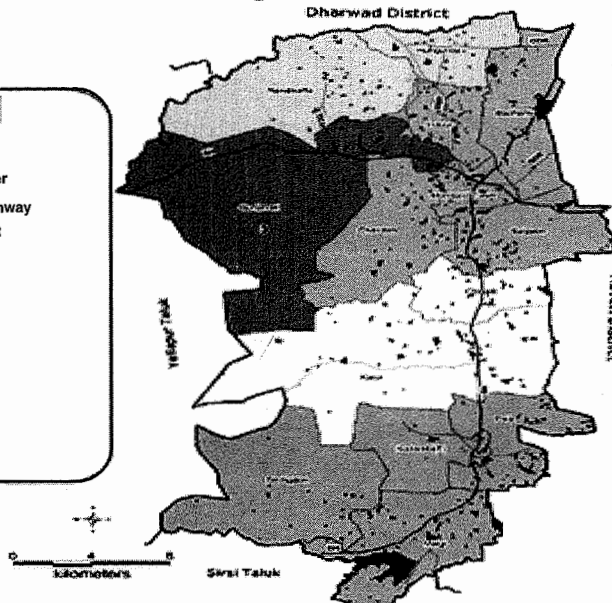
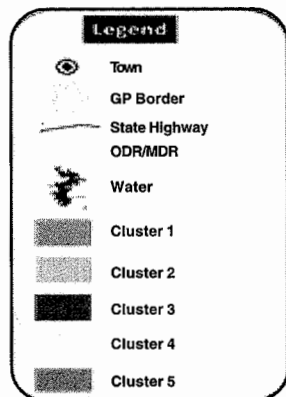
Figure 2.3: Clusters for taluks in the plains agro-climatic zone








| Clusters | Activities |
|---|--|
|  <p>Cluster 1</p> | <p>Beekeeping, livestock and dairying, gobar gas, sericulture, home for elderly; vegetable dyes; medicinal plants cultivation and processing; bamboo products; Tulsi cultivation and extracts; hybrid seeds, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 2</p> | <p>Beekeeping, sericulture; vegetable dyes; handmade paper products; home stay tourism; bamboo products; Pongamia plantations, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; VFC/individual managed home-stay tourism; training in making bamboo cottages</p> |
|  <p>Cluster 3</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, sericulture; Pongamia and neem plantations; biodiesel and bio-pesticides; tamarind plantations and products; poultry; hospital services, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 4</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, sericulture; mulberry nursery; Pongamia and neem plantations; bio-pesticides and biodiesel; purified neem oil; hybrid seeds; poultry, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 5</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, sericulture; poultry feed; Pongamia and neem plantations; biodiesel and bio-pesticides; bio-fertilizers; purified neem oil; hybrid seeds; poultry and powdered eggs; tamarind products, tamarind nursery, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; tour operators</p> |

MUNDGOD

Mundgod Taluk GP Clusters Dharwad District



| Clusters | Activities |
|---|---|
|  <p>Cluster 1</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; CFTRI-based ragi products; organic tomato sauce, poultry, powdered eggs; training institute for handloom and wool-weaving; mango pulp; home stay (linked to mainly Tibetan colony visits), incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 2</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture, poultry, tamarind farms and tamarind products (concentrates etc.); mango pulp, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; training in making bamboo cottages</p> |
|  <p>Cluster 3</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; vegetable dyes; tamarind farms and tamarind products (concentrates etc.), incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition; cloth and paper bags</p> |
|  <p>Cluster 4</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; vegetable dyes; mint cultivation & encapsulation; hybrid seeds, incentives for rare traditional cultivars, incentives to certified organic farmers; incentives for community/private sacred groves in good condition</p> |
|  <p>Cluster 5</p> | <p>Beekeeping, fish farming, livestock and dairying, gobar gas, VFC/panchayat FHM plantations, sericulture; medicinal plants cultivation & processing; hybrid seeds; hospital services, incentives for rare traditional cultivars, incentives for certified organic farmers</p> |