

# **Knowledge Centres/Networks for Empowering Knowledge-Rich and Economically Poor Communities and Innovators: DSS for Solution Augmentation for Sustainable Development**

Anil K Gupta and Srinivas Chokkakula

In this paper, we present an operational framework for a concept of Knowledge Centre/Network developed in the context of ICCD and CBD obligations. The paper draws upon the conceptual framework developed earlier (Gupta, 1995) for an International Conference on Hunger and Poverty organized by IFAD, Rome in cooperation with European Commission and several other civil society organizations. In essence the concept of Knowledge Centres/Network is based on Honey Bee experience. Honey Bee is a metaphorical expression of a philosophy which stands for people to people exchange of knowledge. As the name implies Honey Bee network draws inspiration from the behaviour of Honey Bee which cross pollinates the flowers and does not impoverish the flowers from which it collects the pollen. Similarly, the Honey Bee network makes sure that when knowledge is taken from the farmers, they do not feel short changed or exploited. At the same time, by using local language versions of the newsletter, it connects people to people. Being supported by SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), an international NGO based at Indian Institute of Management, Ahmedabad, India, Honey Bee network is spread now over 70 countries and has local language versions in more than 7 languages. The local language versions facilitate the exchange of knowledge in the local languages and thus connect the communities across cultures. The argument is that the technologies and institutions developed/evolved at grassroots level without any external help may be sustainable. Blending people's knowledge system with modern science may be crucial in achieving the the broad goal of sustainable natural resource management.

## **Context**

We need to look at the concept of sustainable development in a fundamentally different manner if in the strategies of change, they i.e. the so called 'dis-advantaged' themselves have to have a say. This will require that we acknowledge their ability to solve their problems through their own genius. It is true that not every body can find solutions despite their creativity and innovative potential. But is it any less creditable that they are able to survive against all odds despite weak market and state support?

Knowledge Centres/Networks approach assumes that future transformation of developmental alternatives will emerge by networking large number of decentralized nodes around the world generating practical solutions in their regular interaction with natural resources. Since these nodes are distributed across different institutional settings, regional and cultural contexts guided by various philosophical and ethical values, building bridges across these nodes will require respect for pluralism inherent in civil society. This respect will perhaps emanate when we will take into account the existing differences in access, assurances and abilities available to different communities as well as formal institutions across north and south.

**Prof. Anil K Gupta**

February 16, 1996

Dr. R. C. Maheshwari  
Asstt. Director-General (TC)  
Indian Council of Agricultural Research  
Krishi Bhawan, Dr. Rajendra Prasad Road  
New Delhi 110 001

Dear Dr. Maheshwari,

I am enclosing thirty copies of the application form for financial assistance for organizing an international Conference on Creativity and Innovations at Grassroots required vide your letter F.No.27(10)/95-Cdn. (Tech.) dated 13 December, 1995.

Please acknowledge receipt and do the needful.

Yours sincerely,

Anil K Gupta

This network will have to face at least ten challenges in the next century (Gupta, 1995):

to find ways by which people struggling with similar problems in different parts of the world get to know the solutions developed by some innovative and creative communities or individuals in another part of the world.

to link formal and informal science so that value can be added to these innovations.

to mould public policies for development, credit, and science and technology development etc., in a manner that these little innovations can get scaled up or become enterprises.

to make niche markets accessible for decentralized production by communities in different parts of the world particularly for organic or low chemical input products, crafts, other farm and non farm products etc.<sup>1</sup>

to build upon and augment the empathy and concern that poor people seem to have in larger measure for the non human sentient beings as well as nature.

to generate self design institutional innovations which make it possible for people to take control of the resources for sustainable livelihoods. This will include land and water reforms but more importantly reforms in political institutions.

to transform the learning systems and strategies in public systems and also international development institutions. The change is slowly taking place but true proportions of crisis in the post structural adjustment phase is not fully fathomed by leaders of civil society.

to enable Knowledge networks follow an approach of having Two way-Communication and Two way - power. Thus the poor should be able to influence the content of what they need and what they will provide but also determine how the knowledge provided by them will be used. They should have countervailing power to match the power of providers in formal knowledge system.

to involve civil society in taking responsibility for shaping values and generating responsibility for a fair and equitable society devoid of hunger.

to provide youth in or out of educational system an opportunity to recognize the nature of embedded injustice in various existing institutions and the scope for non-violent Gandhian way of correcting them. This is the most difficult challenge. If knowledge centre can network

<sup>1</sup> Not many people have noted a provision in GATT documents about the Non actionable subsidies as applicable to disadvantaged communities and regions. As per this provision, in contagious regions which have unemployment level 110 percent of the average and per capita income 90 per cent of the average, subsidies provided for development are non-actionable. It is a different matter that many developing countries may not have economic resources to subsidize any way. But if subsidies are targeted which they should be, these regions would be entitled to have such subsidy. This will also influence the comparative advantage of the products which may be marketed from these regions globally.

innovators around the world, it may be possible to generate competitiveness in the knowledge and enterprise networks.

These challenges will require a new paradigm of thinking if solutions have to be lasting. First transformation required in our thinking is that we have to move away from just problem solving to solution augmenting strategy. Second, we need to question the moral basis of co-existence of hunger and affluence and restrict not just to the economic and social basis. Both of these transformations are fundamental to the goal of sustainable development.

### **Modification of missions: Getting locked into relevant Knowledge networks**

#### a) *Reducing transactions costs of poor*

Knowledge networks perform the task of socialization of members but not just that. These networks help the members in reducing transaction costs for accessing certain kind of information and increase costs for others. We have to develop such Decision Support Systems (DSS) that will enable several actors in these networks access the relevant decision tools and information at low cost and in real time. These actors would include the grassroots innovators, formal or institutional scientists who would need feed forward from these innovators and also provide scientific support for on farm or on station experimentation, legal activists who fight for social change, internalization of environmental externalities; NGOs and negotiators who provide organizational support from mediating exchanges between entrepreneurs and grassroots innovators, etc.

#### b) *Ethical aspects of accessing information: Persuasion or legislation?*

Recently several of the Pew Conservation scholars endorsed the Ethical guidelines many of us (Pew Conservation Scholars) developed for Accessing and Exploring Biological Diversity. It was realized that ethical responsibility of those who access the diversity for non-extractive non-commercial goals can not be same as that of those who access diversity for commercial and extractive purpose or commercial but non extractive purpose.

It is becoming an important question which Honey bee network has been raising for some years now. Why should local communities and innovators share their knowledge with outsiders when there is no reciprocal obligation.

#### c) *Coping with complexity: Multi actor, multi-level, multi nodal networks*

Knowledge networks include voluntary actors and institutions but can also incorporate mandated or co-opted information nodes. These networks are nested into cultural and political networks. To achieve parsimony the knowledge networks help in simplifying the information and classifying it in the order of complexity. Thus different members in a network having varying capacity to process information and understand complexity can draw and assimilate knowledge of different orders of complexity. If a network provides similar information to everybody, sooner or later it may suffer from alienation, which may lead to indifference and also 'exit'.

d) *Validation through feedback and utilization: Generating authenticity and accountability in networks*

Another feature of knowledge networks is their ability to validate the information through the feedback, and measure and monitor the relevance by gauging the utilization.

The utilization of knowledge is essential but if we produced knowledge which can be used only according to the needs and preferences of current generation, the rights of future generations may get sacrificed. Thus futuristic perspective is essential and a match has to be found between the requirements of utilization today and fertilization of imagination for future use.

e) *Redundancy, reductionism and response*

Redundancy is necessary in any knowledge network. But as I have argued elsewhere (Gupta, 1995a) too much of it can generate inertia and too little can cripple. An optimal amount of redundancy has to be evolved through experimentation and experience. This also requires combining holism with reductionist approach to understand resource use options.

Knowledge networks can also reduce fear and uncertainty if the response time is short and concern for each others' need is high. Asymmetry in power, status, endowments both intellectual and socio economic can create tensions in any knowledge network. One response to deal with such problems of asymmetry is to have loose coupling amongst different channels and nodes of communication and information. For instance, on the contrary, if a given network was to include only one channel, i.e., electronic, and only one level of complexity, i.e. very high and only one language, i.e., English, then larger number of rural people particularly the disadvantaged ones will be excluded.

f) *Vernacularisation of discourse: Language, culture and values*

Without vernacularisation of discourse, there is no way that we can reach people in different language cultures and regions of the world. Since each language also reflects a habit of thought, the knowledge networks need to deal with correspondence among different habits of thoughts (Johansen, 1993). It is sufficient to note that knowledge networks can be very effective if they can not only show sensitivity but also explicitly seek out these differences.

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) is working on the concept of developing a distributed data base systems in Gujarat to begin with among various Gandhian Vidyapeeths. The idea is that farmers in the vicinity of each institutions should be able to draw upon Honey Bee data base on innovations for sustainable natural resource management and send complex problems not addressed by local node to central node. This node will flash it to all other nodes and also other scientific nodes after translating the ideas into language that scientists understand. It is possible that many problems have already been solved, as said earlier by farmers and scientists but in the absence of clear information of interested clients, the relevant information can not be targeted properly. This concept will require rethinking extension systems as these exist today. Since the information exchange will take place in Gujarati, farmers will have no difficulty in communicating among themselves. In due course it should be possible to network farmers organizations all over the country and the world through multi -language interface-- utility which will need to be developed. The greatest problem that we see is the challenge inherent in linking problem solvers around the world not

just with each other but also with data bases that can help them take leap forward and not spend energy in rediscovering the wheel again, though some times rediscovering has its own charm. The process generates some values and empathy which may be difficult to develop without this.

g) *Homogenization of knowledge: Generating pluralism*

Knowledge networks have to recognize the danger of homogenization of knowledge and consequent production and reproduction of a universal culture. It is not surprising therefore to find that metropolitan elite all over the world reads same novels, speaks same language and has similar habits of thought in terms of their indifference to the issues of sustainable development and generation of unethical and accountable system of governance.

h) *Translating ideas: Shaping habits of thought and adding dignity in development*

Knowledge networks being nested in different kinds of consciousness also have to grapple with a process of translation within oneself.

i) *Rethinking 'our' life styles for removing 'their' poverty*

Thus, the knowledge networks have to not only look at old habits of thought but also have to ensure that new habits of thought do not create more problems than they solve. Increasing spread of consumerist culture is certainly one such consequence of new habits of thought spread by elitist media. That is the reason that in most conferences on hunger and poverty elimination, a discussion on changing the life style and consumption pattern of the elite in developing as well as developed countries is always pushed out of the agenda. We ignore the old Gandhian dictum that there is enough in this world for everybody's need but not enough for everyone's greed.

j) *Combining sacred with secular and drawing upon alternative consciousness*

The concept of aparigraha and zakat are two sides of the same coin. The first originating in the Buddhist and the second from Hindu philosophy implies not acquiring and accumulating more than what one's minimal needs are.

The time has come to combine these two judiciously and carefully. If we did not do this, the alternative would be continued growth of intolerance and fundamentalism. In such a context, knowledge networks will fail to achieve the goal of harnessing the saner, secular and the sacred urges of society for achieving sustainable world.

k) *Transition towards diversity and sustainability*

These networks have to thus help make a transition from non-sustainable opportunity matrix to a sustainable one. The scope of such transition is illustrated from the following development models matrix (Gupta et al, 1993) in the next page. The widening of decision making choices and extending the time frame is the ultimate test of any development process. Access to resources, skills and technologies, institutions and cultural networks makes a considerable difference to achieving sustainable outcomes.

## *Development Models*

		Time Frame	
		Short	Long
Range of Choices	Narrow	Non-sustainable	Vulnerable
	Wide	Opportunistic (Non-sustainable)	Sustainable

### 1) *Empowerment through knowledge networks: Linking communication and power*

Power is defined as the ability to change the other's behaviour or response in accordance with one's own preference. How would knowledge networks influence the preference of providers and poor?

Empowerment is thus a process of conceding the right to question and communicate alternative opinions to disadvantaged communities. The only limitation of this definition is that it presupposes that those who have power will willingly share it with others. This definition also masks our -- the external resource provider's -- powerlessness in understanding and uncovering the creativity and entrepreneurship of knowledge-rich and economically-poor people. The latent power of the creative people can manifest through institutions that permit two-way communication and two-way power. However, the process of such an empowerment will vary in various regions and institutional contexts with different vulnerabilities. Thus, the information systems with the help of relevant decision support systems pave the way for empowerment of the communities by realising the power of their knowledge.

One-way communication -- one-way power exists in an authoritarian arrangement. A large number of top-down projects or programmes suffer from this limitation. Since there is no feed back, poor people often either ignore, or become indifferent or sometimes rebel against the oppressive structures.

One-way communication -- two-way power is impossible because those who have power are unlikely to restrain its indefinitely.

One-way communication with no power either way is a case of street singers or tom tom beaters. Generally, such a system survives either as entertainment or as a simple information-diffusion system. In the period of silent revolution, these subtle forms of communication can also create considerable mass upsurge of consciousness.

Two-way communication with one-way power is reflected in the usual training centres or officially designed development programmes. While people can give their feedback, they have no ability or power to ensure action on it. Such a system sooner or later becomes unresponsive to the needs and aspirations of the people at the grassroots.

Two-way communication and two-way power is the most viable and sustainable institutional arrangement. This is an arrangement which Gandhi articulated as "Gram Swarajya" or Village Republic and

Mao Tse Tung called the Mass Line approach. It is true that both failed to achieve it on durable basis. Yet, the merit of the arrangement remains. The two-way communication system may not prevent mistakes altogether but certainly avoids blunders. The power both ways ensures learning and mid-course correction. It also generates mutual accountability and authenticity in transactions. Both the ethical and institutional responsibilities are shouldered in a shared manner.

Two-way communication with no power either way is the system of lateral or collegial learning. Farmer to farmer learning takes place informally. This is a very powerful medium of knowledge buildup though it can also be demoralizing sometimes. This happens when the dominant peer group reinforces despondency and cynicism rather than hope and experimentation.

### **From Knowledge Networks to Knowledge Centres**

The challenge in designing knowledge centres is to combine the spirit of competition and cooperation in such a manner that the capacity building goes hand in hand with accrual of reward for pioneering innovative and entrepreuneuring role. Also the knowledge centres have to be based on the assumption that a poor farmer in a remote region of Asia or Africa may have to handle far more complex information for ensuring survival than possible with the most sophisticated computer. Obviously therefore the hierarchical models will not work. The same person may have high capacity for processing environmental or climatic information but may have very limited capacity to process information about distant markets or even some of the bureaucratic institutions. The knowledge centre will have to build upon another unique property which is of mutual dependence among each node.

Since different nodes may specialize in different kinds of problem solving, the centre for different activities will be in different places. Unlike the classical model of organization having heads of different functions or division in one place reporting to the chief executive officer, the knowledge centre would recognize the distributed expertise and therefore the leadership.

Three principles involved in building self design communities are: The leader is based on skill and not on status. Leadership in one group is perfectly compatible with being follower in another group. The leadership may iterate within the community as well as the among the community and institutional nodes of a knowledge centre. The pooling may be independent of redistribution. Those who pool do not generate a reward for themselves only. They generate a social capital.

Another facet of knowledge centres is to prevent information overload and also reduce entropy in the system. The former would require user based information retrieval and dissemination systems. The latter would require reliance on metaphorical communication rather than only on analogic communications. Generating restraint among communities in using natural resources even when there is no control requires development of institutions. It is obvious that maintaining ecological balance would require restraint in use of resources. But this restraint cannot be generated only on utilitarian grounds and as a technological solution. The economics, ethics, institutions and technology have to be combined in the system of governance. All of these messages may get across through a metaphor or a story or a symbolic communication much better and much faster. In the process the distortion of information and therefore the entropy may be minimized. That is how oral traditions have ensured purity and consistency of communication much more accurately than the written traditions have achieved in terms of values and ethics.



The entropy can also be reduced by having optimal redundancy in the nodes as well as network channels. The most important way to reduce entropy is to link theory with practice. More an idea is tested, tried and transformed, greater is the chance that it will be owned and assimilated in the local knowledge system.

The links between formal and informal knowledge systems have to be crafted carefully if Knowledge Centre has to draw upon both the streams of knowledge. The criteria of evaluation may vary in different knowledge systems. Similarly, the criteria of effectiveness also vary in formal and informal knowledge systems. The knowledge centre cannot validate and authenticate the information collected from different information nodes nor should it try to do so. It can merely vouchsafe for the authenticity of information it generates itself as a node. Therefore, the roles of knowledge centre as a node, hub, coordinator and as a generator of values and norms have to be distinguished.

The goals of knowledge centres/networks would be as follows:

- a. To trigger a multi channel, multi node and multi level network of individuals, institutions and social movements engaged in generating solutions to the problem of hunger and poverty,
- b. To operationalize the action plan of Agenda 21, various articles of CBD and International Convention to Combat Desertification, particularly Article 16(b), Article 18, Article 19 and 20(c & d), Article 25-3(a), Article 26, etc., in order to network existing information channels so as to make innovative solutions accessible to people in a manner that they can use these and share feedback/feed forward.
- c. To generate reciprocity amongst providers and receivers of information so that incentives for problem solvers to network with knowledge centre continue to grow.
- d. To develop and operationalise an international fund for recognizing, respecting and rewarding creativity and innovation at grassroots level ensuring sustainable use of natural resources, protection of basic human rights, gender equality, and ethical discourse and conduct of business.
- e. To network with existing efforts all over the globe with similar goals such as International Foundation for Science, Sweden (IFS), Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), Honey Bee network for indigenous innovations, Tranet, ISEE, IASCP, CIKARD etc.
- f. To mobilize volunteers from private and public sectors, third sector and even religious organizations to generate and support local trust funds to be managed by communities trying to augment innovative solutions developed by them or others.
- g. To set up a venture capital fund for small innovations which may support innovators directly or may underwrite risk or provide bank guarantees for similar funds to be set up in different parts of the world for augmenting peoples capacity to solve their own problems.
- h. To fulfill an ethical obligation towards poor people by ensuring, (i) all the information concerning any programme or project is made available in local language to the peoples' representatives

at local level before designing and implementing the same, (ii) sharing of information during the course of project implementation and respecting the right of people to information, (iii) protecting the intellectual property and cultural heritage rights of local communities.

## **Organizational Arrangement**

### *a) Multi channel, multi node and multi level network*

Initially, the philosophy of knowledge centre should be solution augmenting and not just problem solving. Although whenever a solution is augmented, some problems are indeed solved. But this approach differs from the existing ones primarily in terms of focus and emphasis. When we tried to define the problem we often define our role as the problem solver. Similarly, we assume that solutions cannot be generated locally. Whereas in the latter approach, we assume that people would have made some attempts to solve the problem and someone would have been able to solve it partially or completely. It is recognized that the solutions may be sub-optimal in many cases. And therefore, the emphasis is on augmenting the attempted solutions rather than assuming their absence.

Organizationally, the structures involved in the knowledge centre may resemble a trapeze or a spider's web or an atomic nucleus. There may be support centres on which the web is supported but its main function is not just to cross connect but also absorb the risks of different actors losing their balance. A trapeze artist can concentrate on acrobatics so long as the web below is tied tightly. You loosen one end and he or she may lose the concentration.

However, the problem with these metaphors is that they reflect an image of multi node but single level network. We need multiple levels, multiple nodes and multiple actors to be coordinated in a network. Different nodes at different levels may acquire different structures as expressed through the metaphors such as atomic nucleus, spider's web etc. The flow of the information to different nodes too may vary according to the network structure supporting the node.

### *b) How do we structure such a knowledge centre and where would its core resource team be?*

The structure of a network could be like criss cross circles touching each other at two points. Each circle would have its nucleus in a centre of excellence in a specialized field of knowledge evolved by people. For instance, let us assume that there are two circles dealing with farm and non-farm enterprises respectively. The circle of farm enterprise would have its nucleus amongst the communities which may have developed the most innovations in improving productivity in a sustainable manner, say in arid regions. Similarly, another circle would include nodes having knowledge points dealing with non-farm activities. The nucleus of this circle may be in a community which has achieved the maximum distinction in evolving and sustaining non-farm enterprises in a viable manner. Third circle may deal with institutional expertise in managing common properties.

Each circle will have formal experts as well as informal experts inter-connected. These knowledge points may be linked in small groups through a node located on the circle. Just like a milk route in a dairy project has feeder routes converging at specific collection centres, each node would be converging several other streams of information and action from other systems.

*How well the network works would depend upon how quickly the relevant information is exchanged amongst different nodes using different technologies of communication?*

This process would be similar to what Honey Bee network is trying to do. In addition, the network also ensures through the workshop of innovators that people learn from each other and build their own independent networks. Honey Bee network does not have to coordinate or influence the people's networks which are spun off through these workshops or communications. The knowledge centre will have to evolve an ethical framework which will necessitate pursuit of Honey Bee functions.

### **Operationalization of ICCD/CBD obligations**

The Article 16 of ICCD deals with information collection, analysis and exchange so as to accomplish (a) early warning, and advance planning for adverse climatic periods and (b) practical applications to deal with these variations by the people. It suggests that information needs of the local communities and decision makers are addressed through various ways of information networks integrating physical, biological, social and economic indicators. Article 16(d) suggests use of expertise of governmental and non-governmental organizations for dissemination of information. Article 16(g) provides for exchange of information on local and traditional knowledge, "ensuring adequate protection for it and providing appropriate return from the benefit derived from it, on an equitable basis and on mutually agreed terms, to the local population concerned".

The provisions of Article 16(g) of ICDD can be combined with Article 8(j) and 15.5 of the Convention on Biological Diversity (CBD). In addition to the sharing of benefits, the concept of prior informed consent will also need to be operationalized.

Article 19 and 20 deal with capacity building, education, public awareness and financial resources. The knowledge centre has to play a direct role in fostering the use and dissemination of local knowledge, innovations, etc., primarily, "through innovative ways of promoting alternative livelihoods including training new skills", etc (particularly Article 19-d, h, k).

Article 20 provides for financial mechanisms for achieving various goals through Global Environmental Facility or other means for Africa as well as other affected developing countries. Article 20(d) draws attention to the role of foundations, NGOs and other private entities to bring about debt swaps as well as other innovative means of reducing external debt burden of affected developing countries, particularly in Africa. To operationalize this provision, Knowledge Centre would have to mobilize and network financial nodes for this purpose. Knowledge Centres can create pressure on the global institutions by periodically sharing information on how the trade, environment, technology and resources have been made available for the purpose.

### **Decision Support Systems for Empowerment**

Bhatnagar and Kaul (1978) described the management information system for development planning using village level data to improve the design of local level area specific plans and schemes.

Kaul (1980) discussed how socio economic environment indicators and programme performance indicators could be monitored through district level database which have since become a reality through NICNET network. An example of Dharampur block in Valsad district of Gujarat was given in which such information was compiled and a database management software was illustrated.

Bhatnagar (1992) reviewed various experiments in India in which the information technology had been used for supporting rural development activities. He gave examples of applications in planning road network and service centres, planning and monitoring of rural loan programmes, computerisation of land records, location of infrastructural facilities, general support to district administration, design of canal irrigation system, etc. He stressed the bearing information technology had on changing the administrative culture.

In some other studies, the focus is on decision making at top managers and executive decision makers (Jayashankar, 1989; Finlay, 1989). Walsham (1993) analyses various information systems from developing countries and concludes that a decentralised system does not empower disadvantaged people in a direct sense, but well-designed local information system can perhaps be of indirect help. As apparent from the above studies, DSS have generally been developed for development managers and not for peoples themselves. The idea of knowledge network developed in this paper in that sense makes a departure from these approaches. The intention is to provide decision support to the grassroots innovators and in turn link their expectations with the abilities of support systems in private and public sectors.

We are convinced that unless DSS are developed which empower disadvantaged communities, these will only be developed to empower those who exploit the poor or those who may be indifferent to them. In some rare cases, the sympathetic officials and managers can indeed be empowered but one can not ensure that the information would not be used by those who are not sympathetic to the poor. The two-way communication with two way power has been suggested as a way of empowering local communities and networks of innovators (Gupta, 1980, Gupta et al, 1993).

DSS on local knowledge can be used by Ethno-botanists to reduce transaction costs of seed or drug companies and thus deprive an opportunity to local communities to negotiate fair and just deals. At the same time, in the absence of DSS providing access to information about potential value of local biodiversity, local communities may enter into such deals which are patently unfair. Informed Consent by communities required under Art 15.5 of CBD is possible when communities in far off regions can gain access to such supportive DSS. It should have information on prototype contracts, information on prior uses, other competitors who may be approached for exploring deals etc. At the same time, if local innovators want to become entrepreneurs themselves they would need information about financial agencies, buyers, and other actors who could be of help. Recently a kind of DSS has been developed by Environment Canada for Environmental solutions in Canadian context trying to provide such a support software. We need to develop such CDs in different countries and in various languages with hardware support available at district and taluka level so that local communities can transcend the barriers and filters that metropolitan institutions including big NGOs create in the process of networking communities.

We should also keep in mind that spending excessive energy only on developing DSS without generating capacities among communities for using these DSS will be counterproductive. The provision for clearing house mechanisms under CBD provides another window for linking local generators of innovations and local and global actors who can add value to it, generate feedback or just help it get across to other potential users.

Honey Bee network has several thousand innovations on pest management without using chemical pesticides, veterinary medicine, growth regulators, soil and water conservation, farm implements etc., in its data base which need to be protected and converted into DSS for local decision making. We invite Information science experts to work with us on developing expert systems that local communities can make use of and thus contribute to sustainable thinking, living, and resource use. We will share a sample database of Honey Bee with those interested.

Knowledge centres/Networks approach assumes that databases similar to that of Honey Bee database will be built up in different parts of the world drawing upon the local creativity and innovations. A network of such nodes, each of which will have their own networks with multi-actors at multi levels would form the knowledge network. Decision Support Systems need to be developed at each of these nodes according to the requirement and specialization of these nodes. For instance, if a node specializes in water conservation, the node develops a DSS in cooperation with other similar expert nodes so that the information at these nodes is accessible to other nodes. Similarly, other nodes may require DSS which are crop specific/disease specific according to the requirement and the problems faced in the concerned area of that node. A node which specializes in forestry and horticulture could develop DSS based on the attributes of the local ecosystem for decision making on the kind of tree species, geometrical and other arrangements for the specie mix to be planted in similar situations in other parts of the world.

We will illustrate the above ideas of operationalisation of knowledge centres/networks concept taking the case of water conservation in dry regions. The proposed DSS would help in decision making for both acquisition and adaptation of appropriate technology for water harvesting/moisture conservation in a watershed. The input data would be the geographic characteristics, soil profile, catchment characteristics, climatic parameters, land use patterns and socio-economic and cultural aspects of the same, institutional history of collective action, historical legacy of conflicts if any in resource use or allocation of scarce resources etc. The key questions we will address are; (i) The kind of decisions local communities and planners need to make at different levels of activities in terms of choice of technology in a watershed development plan, (ii) The relation between the form and function of a technology in optimizing water utilization and (iii) and nature of institutional arrangements which might help in sustainability in land use in the given watershed. It has been argued that excessive emphasis on just technology to the exclusion of institutions has led to large scale failure in watershed projects around the world( Gupta, 1995). Honey Bee data base on people's own institutions may be able to fill this gap in the local knowledge in the areas where local knowledge systems are weak in this regard.

Knowledge Networks, thus are a means of connecting local expertise to begin with around different technological and institutional areas of resource management. In due course, these experts will become a resource for local communities for solving their problems. In areas where local solutions are sub-optimal, the Knowledge networks will also provide opportunity to formal scientists to work with local experts and generate collaborative solutions.

- c) *How well the network works would depend upon how quickly the relevant information is exchanged amongst different nodes using different technologies of communication?*

This process would be similar to what Honey Bee network is trying to do. In addition, the network also ensures through the workshop of innovators that people learn from each other and build their own independent networks. Honey Bee network does not have to coordinate or influence the people's networks which are spun off through these workshops or communications. The knowledge centre will have to evolve an ethical framework which will necessitate pursuit of Honey Bee functions.

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### **Decision Support Systems for Empowerment**

The paper provides some issues that we may have to confront in operationalizing these ideas. We are convinced that unless DSS are developed which empower disadvantaged communities, these will only be developed to empower those who exploit the poor. DSS on local knowledge can be used by Ethno-botanists to reduce transaction costs of seed or drug companies and thus deprive an opportunity to local communities to negotiate fair and just deals. At the same time, in the absence of DSS, local communities may enter into such deals which are patently unfair. Informed Consent

by communities required under Art 15.5 of CBD is possible when communities in far of regions can gain access to such DSS which have prototype contracts, information on prior uses, other competitors who may be approached for exploring deals etc. At the same time, if local innovators want to become entrepreneurs themselves they would need sources of agencies, buyers, and other actors who could be of help. Recently a kind of DSS has been developed by Environment Canada for Environmental solutions in Canadian context trying to provide such a support software. We need to develop such CDs in different countries and in various languages with hardware support available at district and taluka level so that local communities can transcend the barriers and filters that metropolitan institutions including big NGOs create in the process of networking communities.

We should also keep in mind that spending excessive energy only on developing DSS without generating capacities among communities for using these DSS will be counterproductive. The provision for clearing house mechanisms under CBD provides another window for linking local generators of innovations and local and global actors who can add value to it, generate feedback or just help it get across to other potential users.

Honey Bee network has several thousand innovations on pest management without using chemical pesticides, veterinary medicine, growth regulators, soil and water conservation, farm implements etc., in its data base which need to be protected and converted into DSS for local decision making. We invite Information science experts to work with us on developing expert systems that local communities can make use of and thus contribute to sustainable thinking, living, and resource use. We will share a sample database of Honey Bee with those interested.

Knowledge centre approach assumes that databases similar to that of Honey Bee database will be built up in different parts of the world drawing upon the local creativity and innovations. A network of such nodes, each of which will have their own networks with multi-actors at multi levels would form the knowledge network. Decision Support Systems need to be developed at each of these nodes according to the requirement and specialization of these nodes. For instance, if a node specializes in water conservation, the node develops a DSS so that the information at the node is accessible to other nodes. Similarly, other nodes may require DSS which are crop specific/disease specific according to the requirement and the problems faced in the influential area of that node. A node which specializes in forestry and horticulture could develop DSS based on probably the surrounding ecosystem attributes for decision making on the kind of tree species to be planted in similar situations in other parts of the world.

We will illustrate the above ideas of operationalisation of knowledge centre/network concept taking the case of water conservation in dry regions. The proposed DSS would help in decision making for both acquisition and adaptation of appropriate technology for water harvesting/moisture conservation in a watershed. The input data would be the geographic characteristics, soil profile, catchment characteristics and climatic parameters. The key questions we will address are; (i) The kind of decisions planners need to make at different levels of functioning in terms of choice of technology in a watershed development plan. (ii) The relation between the form and function of a technology in optimizing water utilization.

## **Bibliography**

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