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CENTRE FOR SCIENCE AND ENVIRONMENT

41, Tughlakabad Institutional Area,

New Delhi 110 062

Phones: 91-11-6981110, 6981124, 6983394, 6986399

Fax: 91-11-6985879, 6980870

Email: cse@cseindia.org

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FOREWORD

The *Conference on Potential of Water Harvesting: Traditions, Policies and Social Mobilisation*, was organised by the Centre for Science and Environment (CSE) from October 3 to 5, 1998, at the India Habitat Centre, New Delhi. The conference was timely as the issue of conserving this vital natural resource is gaining importance the world over. We were also encouraged by the success of our book '*Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems*,' released in 1997. The purpose was not only to review traditional water harvesting systems of India but also to assess the potential of evolving a new water management paradigm, wherein the government can work along with the civil society to make water everybody's business.

The presence of President of India, Shri K R Narayanan, and five rural water engineers turned the conference into a memorable event. The role of A Vaidyanathan, Professor Emeritus, Madras Institute of Development Studies and the doyen of India's water economists, enabled us to pilot the conference in a way to bring out the common wisdom of the conference captured in its Statement of Shared Concern. The participants included politicians, activists, academics, field workers and administrators. Several people from abroad were also present at the conference. Among several eminent people who participated were Shri Mani Shankar Aiyer, Shri Babagouda Patil, Shri P A Sangma and Shri Digvijay Singh.

The Statement of Shared Concern is an outcome of the comments received from the Chairperson of the conference, the Chairs of various sessions and working groups of the conference, and from the participants. In addition to the papers an agenda for deliberation was presented on the second day of the conference. These were classified as: (i) Policy support systems needed for water harvesting in urban areas; (ii) Policy support systems needed for water harvesting in rural areas; (iii) the need for networking, and (iv) scientific and technological research. These four issues were discussed by four working groups. The working groups and the coordination committees modified and expanded the statement. This was presented during an open forum in the final session of the conference. These comments were further incorporated and sent to all the participants for final comments. The final draft was approved by Prof. A Vaidyanathan, the Chairperson of the Conference. The statement has gone through five stages of editing, redrafting, expansion and modification. We are really grateful for the perseverance and tolerance shown by our conference chairperson, the chairs of various sessions and working groups, and the participants.

We are really hopeful that the Statement of Shared Concern issued by the conference will open up debate among grassroots workers, researchers and policy makers so that appropriate policy formulation and action will follow.

Inaugural speech of
SHRI K R NARAYANAN

Honourable President of India
on Saturday, October 3, 1998, Vigyan Bhavan, New Delhi



Honourable minister Babagouda Patil, Prof. Vaidyanathan, Mr. Anil Agarwal, Ms Sunita Narain and distinguished friends. This has been a very heart-warming function indeed. I must congratulate the Centre for Science and Environment for the very creative and original way in which you have organised and conducted this function. There can be no subject more important for humankind than water. A well-managed society is one that knows

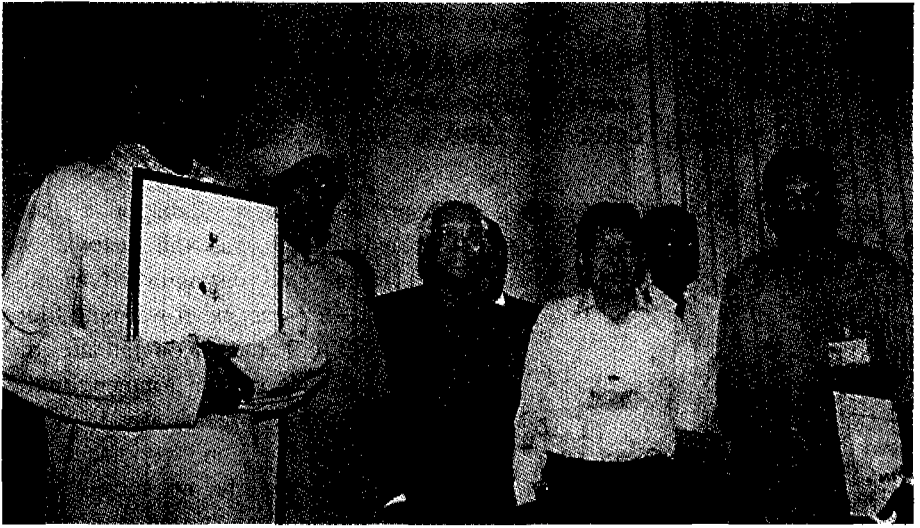
how to treat its water with care, with prudence, with respect. Above all, with a sense of its being a universal asset.

But this universal asset is being fast depleted. Leading experts on water resources have been warning that the world is heading towards "a water shock" which may dwarf the oil crisis. Some 80 countries and 40% of the world population are already experiencing "water stress". Environmental degradation and population explosion are making the problem even more acute, with pollution poisoning the water that is available.

Today, India faces an acute water crisis. The shortage of water and the growing pollution of water has acquired the proportion of a crisis for our people, and most of all, for the poorest of our poor. Some estimates show that almost the whole of India's economic growth gets wiped out by the health costs of water pollution, which do not get factored into our economic calculations. Until a few years ago, nobody had heard of bottled water but today it is a booming industry, as the rich try to protect themselves from the ravages of the environment. Today, a large proportion of urban India drinks bottled water. It is sad that water is fast becoming as expensive as milk. We must ask ourselves if this is the kind of economic growth we want.

Historically Indians have been the world's greatest water harvesters. Over centuries they had developed a range of techniques to harvest every possible form of water from rainwater to ground water, stream to river water and flood water. In 1920 when British authorities invited Sir William Willcocks, an irrigation expert, to advise them on why India was suffering from repeated famines, he categorically told them that the British would do best to learn from the natives themselves.

India today needs a people's movement to meet its water needs and to protect



The President Shri K R Narayanan felicitating rural engineers at the CSE Conference. (From left to right). Ran Singh Punia and Magga Ram Suthar from Rajasthan, President Shri K R Narayanan, Chewang Norphel from Jammu and Kashmir, Ganeshan from Tamil Nadu and Father Yesudas standing in for Kunhikannan Nair from Kerala.

its water sources. Over the years, the state has replaced the traditional role of communities and households in meeting their water needs. We must make every household and every community get involved both in the provision of water and in the protection of water sources.

This will also lead to re-establishing a strong relationship between the people and their environment. Water and land go together. If the land is degraded, the water will run off fast and the soil carried away into the village tank and fill it up very fast, thus, reducing the availability of water. If the land is dirty, it will bring polluted water.

But encouraging a people's movement means a redefinition of everybody's role. The State and its various agencies must change from the role of a provider to that of an enabler and supporter. It means empowerment of rural and urban communities and households to manage their own affairs. And it means that the civil society has to play a critical role in encouraging equity and sustainability in the use of water.

There is today talk about subsidies encouraging wasteful use of water. There is equally talk today about privatisation of water supply. There is no doubt that there is today extremely wasteful use of water, and our rivers and groundwaters are becoming dirtier. At the same time, the government does not have as much funds as is required to deal with the massive problems we face in water supply and in keeping our waters clean even as we face the spectre of squandered financial resources because of half-finished projects and projects lying unused because of lack of repairs.

A people's movement for water can help to deal with a lot of the ills that we face today. Privatisation need not only mean private companies. Rural and urban communities and households are also major non-State actors which can contribute their might. They can make major investments. Even the poorest of the poor can contribute labour. This will not only add to the availability of state funds but also greatly reduce the need for perpetual subsidies. And involvement of the people will mean greater ownership of the projects by the people.

For all this we will need a people's technology, a technology that the people can develop, use and manage themselves. This is where our traditional technologies of water harvesting can play a critical role. Water harvesting means capturing rain where it falls, capturing it in your own town and village, and taking measures to keep that water clean. But the use of traditional technologies does not mean that we do not need modern science and technology. Innovation and upgradation should be an essential part of our efforts to revive our traditions in water harvesting. A people's movement does not necessarily mean leaving people to their own resources. It, of course, means bringing out their initiative, their self-reliance and their enthusiasm. But it also means that the educated and enlightened sections of society should get involved in their development and help and guide them. The State, the NGOs and the scientists have important roles to play. New and simple scientific techniques and methods developed must be disseminated among the people like treatment for preventing evaporation from traditional water tanks.

To promote a people's movement, we will also need laws that encourage the people to take action in their own hands. Urban development rules should encourage all houses to have their own water harvesting system. It is encouraging that Chennai has taken a lead in this and several builders and architects are beginning to recognise the need to do so. This kind of water harvesting can greatly help to recharge groundwater, keep the freshwater table up, and in a coastal city like Chennai, keep the seawater out. The town of Aizawl, similarly, has shown how many of our towns can meet their drinking water needs through rainwater harvesting, something in which the government hardly invested anything. All villages must, in fact, be encouraged to construct and maintain their own water harvesting systems. India's rural development schemes should incorporate water harvesting into their programmes. I have been asked by Mr. Anil Agarwal if Rashtrapati Bhavan would employ these techniques of water harvesting for our own gardening purposes. I am happy to accept the CSE offer and invite it to develop a plan for us.

For a people's movement for good water management we will need a massive programme to promote water literacy. Our Honourable minister has referred to this but having seen the wonderful film today I feel the best teachers for propagating this water literacy are the heroes of various parts of India, we have seen on the film today. I will particularly congratulate them for the remarkable, original and



Appreciating the Centre for Science and Environment's request to undertake water harvesting in the Rashtrapati Bhavan, President, Shri K R Narayanan, said "I am happy to accept the CSE's offer and invite it to develop a plan for us."

creative work they have done in different parts of India and I am sure they are the greatest teachers of how to undertake water harvesting in our country, even sophisticated scientists have a lot to learn from them. Water must become a part of the school curriculum. Water harvesting must become a subject of technical curricula — in civil engineering, in architecture, in urban planning, in development studies, in economic studies and in health and medical sciences. Meanwhile, the media, especially the electronic medium, must play a very important role in creating this water literacy. Surely, we cannot allow millions of our children to continue to die of diarrhea and dysentery even in the 21st century.

Reading through "Dying Wisdom", the report produced by the Centre for Science and Environment, and other reports of the centre, I am delighted to note the excellent work that is being done by numerous rural communities and non-governmental organisations in creating a new relationship between people and water. The work of the villagers of Ralegan Siddhi under the leadership of Krishna Bhaurao Hazare in Ahmednagar district, the villagers of Sukhomajri under the leadership of P R Mishra, and the numerous villages in Alwar district under the leadership of Rajendra Singh of Tarun Bharat Sangh is telling us loud and clear that a new relationship can be created. The inspiration provided by Ralegan Siddhi has already resulted in a government-sponsored but people-managed watershed development programme in

Madhya Pradesh with excellent results in the extremely-poor and drought-prone, tribal district of Jhabua. Today, the government of Andhra Pradesh is also trying to develop a similar watershed development programme. These are all efforts that should be widely known and widely emulated both in policy and in practice.

Yesterday was Gandhiji's birthday. His message of people-centred development remains even truer for the 21st century. He had thought deeply on the question of conserving our water resources for the benefit of our people. I should like to quote what he had specifically to say about this problem. In February, 1946 he said at his prayer meeting:

"In this land of ours, fabulously rich in natural resources, there is the lofty Himalaya with its ever-lasting snows where, they say, dwells the Lord of the Universe. It has mighty rivers like the Ganges. But owing to our neglect and folly, the year's rains are allowed to run down into the Bay of Bengal and the Arabian Sea. If all this water was trapped and harnessed into irrigational purposes by the construction of dams and tanks, there should be no famine or food shortage in India."

Referring to our ground water resources, Gandhiji added:

"...we need not pathetically resign ourselves to fate, fixing our gaze at the skies for the rains to come. There is an inexhaustible reservoir of water in the bowels of the earth. It should be tapped, even though we may have to dig two thousand feet deep for it, and used for growing food. We may not blame fate before we have exhausted all available means for combating a threatening calamity."

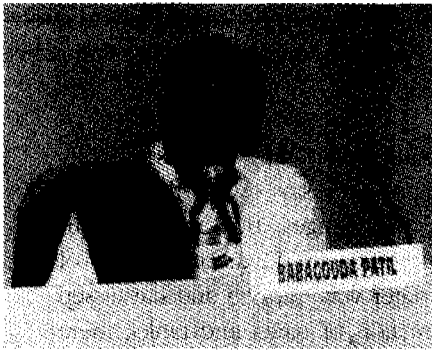
May I congratulate the Centre for Science and Environment for organising this Conference as the beginning of a movement in social mobilisation for water harvesting. I am glad that village engineers and grassroots technologists who are involved in using traditional rain water harvesting systems are also present in this conference. I wish the conference all success. — **Jai Hind.**

CATCHING WATER FOR THE PRESIDENT

A month after the Conference, the President invited the CSE team to harvest water on the President's Estate. The team hopes to set up a system that will collect enough water to meet the needs of about 10,000 people. This could serve as a model for the nation.

Speech of the Chief Guest
SHRI BABAGOUDA PATIL

Honourable Minister for Rural Areas and Employment
Government of India



His Excellency Shri Narayanaji, Shri Anil Agarwal, Dr. Vaidyanathan and Dr. Adithiyar Appan, distinguished delegates, ladies and gentlemen.

I deem it an honour to be present amidst you this morning for this very important National Conference on Potential of Water Harvesting: Technologies, Policies and Social Mobilisation. As you are all aware, our government is committed to providing

safe drinking water to all the villages in the next five years. My ministry in coordination with the state governments is to cover all the NC habitations in the next one year and all the PC habitations in 2-3 years time so that the promise made in the national agenda for governance is fulfilled.

Water is the most essential item for mankind's day-to-day living. The time has come when society should know how to manage its water resources and how to share it equitably. With more than 85% of the rural water supply being through the groundwater, it is important attention be focussed to manage water so that competing demands on groundwater can be met adequately. Sustainability of the source has become a prime issue in rural water supply especially in the 279 over-exploited, 179 dark and 585 grey blocks in the country. There is thus an urgent need to recharge the groundwater so that India does not continue to face an acute water crisis. In this context, I have already sought coordination of all those concerned for identifying and formulating, viable schemes for recharging the groundwater. Against this grim backdrop, the National Conference on Potential of Water Harvesting assumes greater importance.

I hope the deliberations during the conference will be a milestone in our concerted efforts to bring 'sustainable development' to the centre-stage of the national debate and collective action. — **Jai hind !**

HIGHLIGHTS OF THE CONFERENCE

The challenge in the 21st century lies in developing a new paradigm in which water becomes everybody's business. A paradigm in which the household and the community will enter a new relationship with the state in water management.

ANIL AGARWAL, CSE.

"Exclusion of local people from any activity which is directly related to them, instead of seeing success, becomes a major impediment. Let the people have the power to regenerate the water"

R GOPALAKRISHNAN, *Secretary to the Chief Minister and Coordinator, Rajiv Gandhi Mission, Government of Madhya Pradesh, Bhopal*

"Government has been making plans and Acts to harness and regularise water, but the pathetic thing is that they are not consulting people."

V GANGADHAR, *Reader, S V University, Tirupati.*

"While we respect the traditional wisdom, the use of technology should not be ignored."

DR R A MASHELKAR, *Director General, Council of Scientific and Industrial Research (CSIR).*

"Our policies are too technocratic and rational to be human. We have to go beyond politics, economics and the government-NGO business to grapple with the problems."

PROF H M DESARDA, *Former Member of State Planning Commission, Aurangabad.*

"The main problem is that lakes and waterbodies of the cities are being strangled by mindless urban growth. We require an effective and consistent action plan to save these urban water bodies."

K L VYAS, *Save the Lakes Campaign, Hyderabad.*

"It is good that such a big conference is being held on a national basis on water harvesting systems. But the knowledge should be accessible to the rural people who are directly concerned with discussions, so that they are also involved in the whole process."

GANESHLAL GUJJAR, *President Mewar Farmers Development Committee, Rajasthan.*

RECOMMENDATIONS

of the CSE Conference on Potential of Water Harvesting: Traditions, Policies and Social Mobilisation, New Delhi, October 3-5, 1998

Taking note of the Statement of Shared Concern issued by the participants of CSE's Conference on Traditional Water Harvesting Systems (New Delhi, October 9-11, 1990) and published in the Citizens' Fourth Report on the State of India's Environment entitled *Dying Wisdom: The Rise, Fall and Potential of Traditional Water Harvesting Systems* (appended as Annexure 1), we the participants of the CSE Conference on Potential of Water Harvesting: Traditions, Policies and Social Mobilisation (New Delhi, October 3- 5, 1998), conclude the following:

I. THE CHALLENGE AHEAD: WATER, FOOD AND LIVELIHOOD SECURITY



■ India's ancient tradition of community-based water harvesting is declining. The role of the State in water management has increased, while that of communities and individual households has decreased. Simultaneously, there has been a growing reliance on river water and deeper layers of groundwater aquifers, as compared to the earlier dependence on rainwater, local runoff, floodwaters and the top layers of the groundwater aquifers. The modern paradigm has resulted in mismanagement of both groundwater sources and riverwater, and also in water-use behaviour, which does not reflect concern for the growing scarcity of water. Subsidised

water service by the state has further encouraged this behaviour and put limited water sources under stress.

■ There are still thousands of villages in India which do not get adequate or clean drinking water. Hardly any town of India gets round-the-clock water supply. In addition to the problems of quantity, there are growing problems with quality. Not only surface water resources, but groundwater resources are also being polluted, especially in urban and industrial areas and in areas where agricultural modernisation has led to increased use of agro-chemicals. The growing threat of fluorosis and the latest dangers of arsenic in groundwater used for drinking indicates geochemical changes in the groundwater environment that are already having extremely serious effects on public health. Further, coastal aquifers and some of the inland aquifers are increasingly becoming brackish, which further degrades drinking water quality and makes its availability scarcer.

■ Improving the soil moisture status and providing for supplemental irrigation from local water resources is crucial for raising productivity of rainfed lands and in restoring degraded lands to their full potential.

■ We believe that it is essential to promote community and household involvement in water management and give greater importance to extending and improving local water harvesting systems — through techniques like rooftop water harvesting, storage of local runoff and recharging of groundwater aquifers in a framework of integrated land-water development, on a watershed basis. Community action backed by an appropriate decentralised legislative framework can play a key role in preventing overexploitation of groundwater resources. This can play a critical role in meeting the country's growing water needs in a sustainable way, and, thus, improve water supply, food and livelihood security and animal care, reduce dependence on the state, and involve people in protecting and making sustainable use of their water resources.

■ We believe that a new paradigm is needed to manage water that can be built, both on past traditions and the current practices of numerous communities in India and other parts of the world, which still remain outside the fold of State-managed water supply systems. These traditional systems should be further improved through appropriate adaptation and integration of modern systems, where possible.

■ This does not mean that we believe that the State has no role to play in water management or there is no role for centralised water supply systems. But there is clearly an urgent need today to restore a balance between the role of the State and that of communities and individual households. There is a need to give much

greater importance to harnessing local rainfall and local runoff to meet water needs, thereby achieving a better balance and complementarity between large and small systems, and between surface and groundwater use.

II. THE STRUGGLE FOR A NEW PARADIGM

■ Emerging paradigm:

A new paradigm in water management is already emerging due to the efforts of both government and non-governmental agencies.

■ Growing interest in water harvesting:

A survey of developments, within India and abroad, in the past decade shows that numerous projects have been undertaken to promote local water harvesting both in urban and rural areas. There have been some outstanding efforts to promote water harvesting in countries of South Asia and industrial countries such as Japan and Germany. Water harvesting can no longer be labelled a technology of the past and fit only for the poor and rural areas. Water harvesting is as relevant today for the rich as it is for the poor and it is as relevant for urban areas as it is for rural areas. Equally, it is as relevant for arid areas as it is for high-rainfall, humid regions. It is a universal technology which is relevant to all with location-specific applications.

■ Rural water harvesting efforts:

Local water harvesting projects are being increasingly taken up by government agencies and civil society institutions in rural areas. These projects aim to:

- Provide drinking water;
- Provide water for irrigation, especially for supplemental and life-saving irrigation; and,
- Increase groundwater recharge to ensure sustainability of water sources.

Experience shows that water harvesting projects in rural areas have slowly led to overall village ecosystem management (that is, land-water-biomass management at the village level) with substantial economic returns through improved agricultural productivity and an increase in animal products. Indian experiences in villages like Sukhomajri near Chandigarh, Ralegan Siddhi in Ahmednagar district in Maharashtra, the numerous villages of Alwar district in Rajasthan and the villages of Palamu district in Bihar, show that water harvesting can start off a chain of highly synergetic, substantial ecological and economic changes which uphold the adage that water is wealth.

These examples have inspired some state governments to undertake watershed management on an integrated basis by communities. Water harvesting to increase groundwater recharge is also being successfully attempted by several village com-

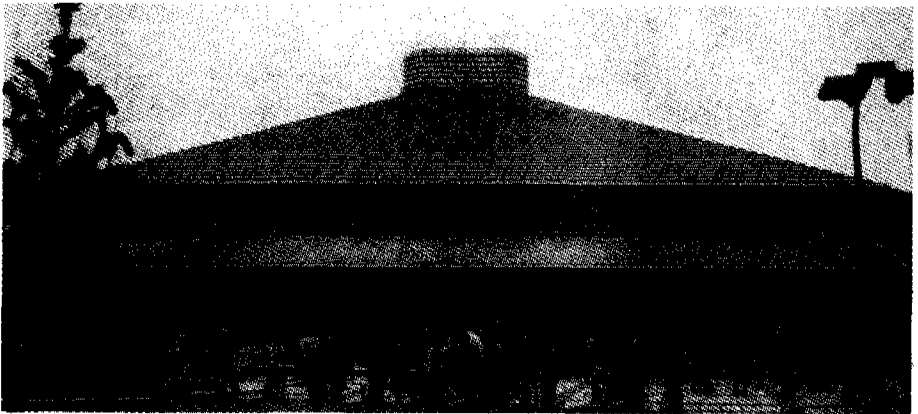
munities in the arid parts of Gujarat. At the same time, several institutions even in a high-rainfall state like Kerala are beginning to advocate the importance of local water harvesting to meet community water needs.

■ Urban water harvesting efforts:

In urban areas, water harvesting can be undertaken for a variety of purposes:

- To increase water supply for potable water needs;
- To increase water supply for low-quality household uses like gardening, washing clothes and for sanitary needs;
- To provide water for institutional needs;
- To increase groundwater recharge to improve the quantity and quality of groundwater; and,
- To reduce stormwater runoff and thus avoid flooding of urban areas and overloading of urban drainage and sewage treatment plants.

A variety of measures have been undertaken by governments to promote water harvesting by urban households. In the city of Chennai, urban authorities have made it mandatory under the city's building regulations for all new buildings to have water harvesting mechanisms primarily to recharge the groundwater aquifers. In Bonn, a fiscal incentive is provided to households through a municipal tax that forces households to pay for runoff producing areas like paved areas and the roof area, unless they unpave the paved areas or collect the rainwater from rooftops and paved areas for domestic use. The primary objective in Bonn is to reduce urban flooding and overloading of sewage treatment plants and to increase groundwater recharge locally. Sumida city, a ward of Tokyo, provides a subsidy to all households interested in developing water harvesting systems. The main objective here is to promote the use of rainwater for low-quality household uses, for drinking in emergency situations and to reduce urban flooding. If any subsidies are provided



At Ryogotku Kokugikan, Tokyo's famous Sumo wrestling arena, 70 per cent of the facilities, including the air-conditioning system and toilets use rainwater collected from its roof.

to promote urban water harvesting, it must be ensured that only the poor and lower middle classes benefit from them.

■ **Water conservation and demand management:**

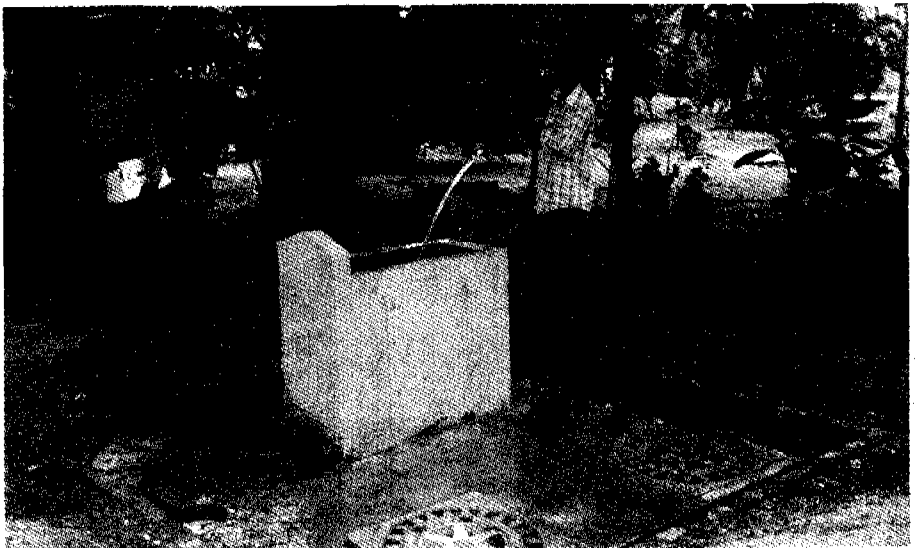
All these efforts show that we can never overemphasize the fact that water conservation and demand management are just as important as efforts to augment water supplies and this brings out the critical importance of water pricing and other fiscal incentives.

III. THE POTENTIAL

■ **Rural potential:**

Water harvesting should be combined with village ecosystem management or watershed development as an important strategy. This will alleviate scarcity in the short run, sustain the growth of income and employment from rainfed agriculture and reclaim degraded lands in the long run.

Given the synergy that exists between population density and rainfall levels, there is really no village in India and in many parts of the developing world that cannot meet its drinking and cooking water needs through water harvesting. In areas which have less rainfall, population density is usually low and land availability for water harvesting is high. In areas which have high rainfall, population density is high and thus land requirement for water harvesting is low in such villages and efforts can be made to promote rooftop water harvesting.



Demonstration models of rainwater harvesting systems at Chennai Metro Water Supply and Sewage Board office.

■ **Urban potential:**

In urban areas, too, rooftop water harvesting has an enormous potential to reduce the demand on river and groundwater systems, many of which are getting increasingly overexploited and polluted.

■ **Mass movement potential:**

The best thing about water harvesting is that households and communities can get involved in increasing and managing their water supply. Thus, water harvesting has the potential to become a mass movement. Individuals and local NGOs can easily take up the work of increasing awareness, educating people and mobilising local action. The aim is that community self-reliance is increased while dependence on the State is reduced.

■ **Human security:**

Water harvesting can play a significant role in providing water security and since water is wealth, can thus provide food and livelihood security.

IV. THE AGENDA FOR ACTION

For the new water management paradigm to take roots, state agencies and international development agencies should work together with institutions of the civil society to promote:

■ **Water literacy**

A national campaign for 'water literacy' is required to spread the message that water is a very precious natural resource, with a value system that makes water everybody's business, and which inspires people by disseminating information about success stories. The campaign should also make 'water professionals and policy makers' aware of the social and ecological contexts, the realities of water management and the relationship between water use and total biomass production within a village ecosystem. The campaign must not only make people aware of what works but also make them conscious of the ecological and economic changes that pose a threat to future water availability in terms of quantity and its quality.

It is important to realise that investments in creating this water literacy are going to be critical for undertaking a major shift in the water management paradigm and for success in moving towards a nationwide programme for people-managed water supply systems. Without mass consciousness and people's cooperation, crores of rupees can be spent on projects without adequate results. Everyone needs to comprehend the role of water in improving the quality of life.

Water harvesting is already a component of government watershed development and rural drinking water supply programmes. However, there is a need to



Water Literacy campaign launched by women groups of Tarun Bharat Sangh to spread awareness through the *pani yatra*.

increase the awareness and understanding of the potential of water harvesting among officials dealing with rural and urban development on a nationwide basis and to strengthen the water harvesting component in rural and urban development programmes.

Communication channels between engineers and environmentalists need to be improved and strengthened to obtain better results.

It is equally important to educate political leaders and officials about the potential of community and household-based water harvesting. They are generally of the view that only large water supply projects are necessary.

Given the new and welcome emphasis on local institutions, following the 73rd and 74th Amendments to the Indian Constitution, it is important to educate village and urban leaders in the country also about the importance of water harvesting.

Water harvesting should be included in the curricula of schools, colleges and universities. It should be made a compulsory subject for engineers and town planners. Mass awareness should be created by the media, by NGOs and the government. The electronic media, especially of the government, should provide free time for such messages.

National and state awards should be given to persons and communities in recognition for their outstanding efforts.

■ **Social mobilisation**

A process of social mobilisation is needed to involve and encourage communities and households to undertake water management to meet their water needs.

This process will demand a fresh look at the role of the government, institutional and financial mechanisms, legal rights and technical needs.

The government must not see itself in the role of a constructor of water projects, their maintainer or a distributor of water. It should play the part of a social facilitator/mobiliser. This means that the government must be prepared to hand over several powers to local actors and in doing so, it must not be niggardly. In other words, it must not tie the community in knots by giving it limited powers, while retaining most with itself. The Government needs to delineate water rights on an equitable basis through community organisation for socio-economic development of the poor. Further, at the local level, NGOs should act as social mobilisers and encourage the communities to undertake water harvesting activities.

The government should also be prepared to provide free access to water-related information available with its various agencies, including access to information about the government's own programmes which are being planned.

The State should work towards creating an enabling environment in which community institutions can function. It means both dismantling restrictive laws and regulations, and enunciating a framework of general principles to serve as guidelines for community institutions. It has to take the responsibility to define both the principles and mechanisms by which intra- and inter-community disputes can be resolved through mutual negotiations and other informal methods. This also requires the State ensures that these processes are institutionalised and insulated from external influences.

The state should provide the necessary technical and financial support without creating overdependence on its various agencies.

■ Financial assistance

The government should come forward to provide financial assistance to communities and households in addition to their contribution. Everybody has something to contribute. The rich have money to pay and the poor have labour to contribute, though the landless and the very poor will have to be provided wages to build water harvesting structures. People must be urged to save and contribute money and labour for maintenance. As much as possible, people must be allowed to undertake construction themselves otherwise, they must be involved in the supervision of the construction. The people must be involved in the decision on what to construct. It is equally vital that people must know what money has been given to their community and for what purpose.

All these are ingredients of a system of incentives meant to encourage community institutions to function effectively and take decisions.

■ Priority regions

The priority regions for water harvesting should be areas those which have a high intensity of land degradation and low productivity of rainfed agriculture. Water harvesting should be taken up together with measures for good land and

biomass management.

Water harvesting should be taken up on a priority basis in all regions where groundwater is the main source of drinking water but is saline or contaminated by industrial waste. Water harvesting for groundwater recharge could also be considered in such areas to reduce the concentration of groundwater contaminants. Such an approach would lead to greater investments in the village community itself and in improving its standard of living, rather than investments in high technology devices which later lie unused in construction projects. An appropriate selection of technology is required that incorporates local features and its economics. Rooftop water harvesting programmes in such areas will not just provide clean drinking water but, depending on the need, such programmes could also help to invest in improvements in rural housing. These programmes assume great importance as most poor households have thatched roofs. Rural housing programmes should also include a component of rooftop water harvesting where necessary.

Water harvesting should also be given priority in towns and settlements dependent on drinking water from lakes which are getting increasingly polluted.

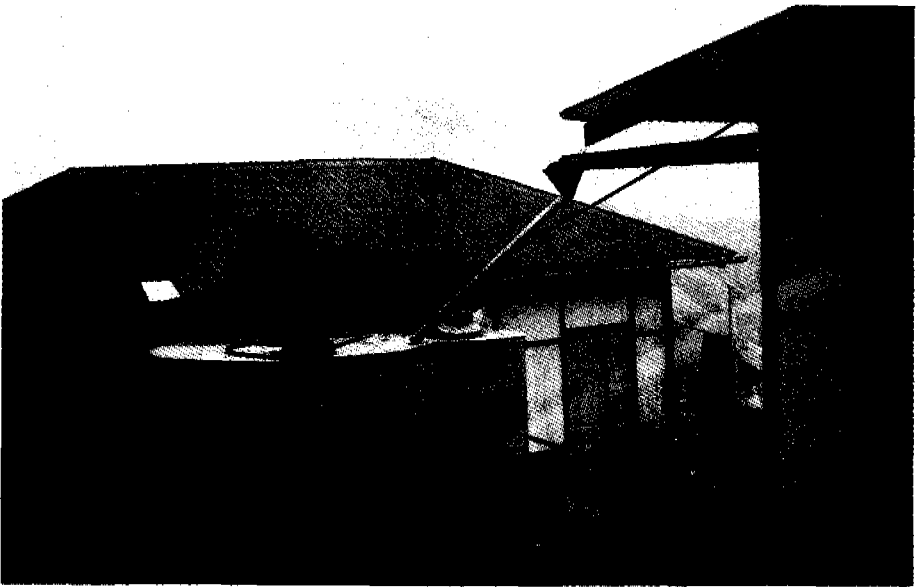
■ Urban water harvesting

In order to promote water harvesting in urban buildings, development bylaws need to be suitably formulated or modified. The following steps need to be taken:

- Every urban area should have a master plan, wherein water catchment areas are clearly demarcated and should be left undisturbed. Municipal corporations should demarcate such land and utilise them as water catchment areas. These catchments can be used for afforestation by the forest department or can be transferred to the Forest Department as an urban sanctuary, so that its land use cannot be changed without government approval.
- Prior clearance before land acquisition to ensure that water catchment areas are not disturbed.
- A single water authority or local body, as the case may be, should be vested with the control and regulation of all water bodies including rivers/canals/waterways/groundwater aquifers in urban areas.
- Town planners/local authorities should provide for surface water percolation along roads, pavements and other open spaces.
- All building plans must provide for water harvesting structures (WH) before applications are accepted, though provisions for exemptions should exist for those who cannot build water harvesting structures for genuine reasons like lack of space. A beginning can be made with statutory provisions for public buildings and large structures and making water audits essential.
- Provision of WH systems in plans should be followed up by enforcement at the time of grant of water and/ or sewer connections/assessment of property tax, etc.
- Builders and planners should be given clear technical guidelines on precautions

to be observed in providing WH systems so that there is no contamination with septic tanks. The local authority in charge of water supply should be responsible for the maintenance of rivers and other water bodies with the specific aim to use them for water storage through WH systems. More efforts are needed to simplify approval procedures to reduce the overload on the existing administration.

- Master plans for rainwater collection and use for all urban centres should be made a prerequisite for meeting eligibility requirements of funding agencies like HUDCO, World Bank, etc.
- The misuse of water bodies and waterways through sewage discharges should be restricted with provisions made for interceptory sewers and canals along waterways. This is an expensive proposition but can be taken up in a phased manner. At the same time, no new housing/commercial/industrial/construction activity, by private or government agencies, should be allowed till a proper sewer system is laid and commissioned.
- A large number of urban local authorities are both water- and cash-starved. A WH fund can be promoted by the government in the form of loans or grants.
- WH systems should be promoted as a means of both providing water and preventing floods so that the message and the need is permanent.
- Individual and community participation can be encouraged by offering subsidies, rebates or a progressive water tariff.
- A central nodal agency should provide technical and engineering advice on



Rooftop water harvesting in Alzwal, where metal gutters run along the slanting roof to channel water to a tank. The Mizoram government, as a policy promotes rooftop water harvesting.

structures and systems to be used particularly in urban areas where the availability of non-paved areas is increasingly getting limited.

- Industrial houses should be encouraged, through incentives as well as town planning requirements, to provide for water harvesting on their premises and to maintain at least one WH community structure in an urban area.
- It should be made mandatory for airports to utilise the run-off water on their land to recharge groundwater and meet their requirements. Similarly, all highways and roads should construct structures to collect rainwater in order to sustain green strips on both sides.

■ Protection of waterbodies

It is not just important to promote water harvesting projects. It is equally important to protect and revive, to their full potential, existing water harvesting structures in both urban and rural India. The traditional water harvesting systems need to be respected as they are simple and sustainable and farmers execute them with little assistance. Given India's traditions in water harvesting, these structures constitute a rich heritage which, despite their dilapidated condition, continue to play an important ecological and economic role in the local environment. Citizen groups who are trying to protect these urban water harvesting structures from further erosion and prevent the degradation of their catchment areas, need to be fully supported. Urban waterbodies are under severe pressure from polluting activities in their watersheds and encroachment by construction lobbies. Full costs need to be recovered from offenders. Many cities, which once had numerous water harvesting structures, have hardly any left today.



Politicians and land-grabbers have become a threat to tanks. Tankbeds have been taken over by colonies, factories, and even party headquarters.

There is a need to develop a data bank on the environmental status of both urban and rural watersheds. Moreover, the water spread area of both urban and rural waterbodies should be identified on the ground and demarcated on maps. Outside this periphery, a buffer zone of 200 metres width around a waterbody, especially in the upstream areas, should be delineated as 'no construction zone'. All land within this 'no construction zone' could be acquired and handed over to the forest department. While waterbodies can be identified for private and government ownership, monitoring of water quality (especially in urban areas) should be entrusted to independent, competent bodies or universities to ensure proper maintenance of the water body and credibility of the water quality reports.

■ **Fiscal incentives and regulatory mechanisms**

There is clearly a need to study the possibility and feasibility of various fiscal incentives and regulatory mechanisms for promotion of water harvesting. Without appropriate pricing of water and electricity, households and institutions will have little economic interest to meet a significant part of their water needs through local water harvesting, and, thus, reduce the pressure on municipal water supply systems. The efforts made by Frankfurt Airport managers to meet a large part of their water needs is a case in point. The system set in place was able to save them unnecessary expenses.

There should be differential pricing of water for industry, domestic use, irrigation and landless communities. This will require research, for example, on how the water should be priced. For effective utilisation of water resources, research is also needed on pricing and legal rights of water while respecting social equity.

One option is for government agencies to concentrate on the provision of clean water supply for drinking and cooking, leaving households and communities to develop their own water harvesting structures to meet other lower quality water uses. The project can be supported with appropriate fiscal incentives. Currently in urban areas, all household activities utilise potable water, regardless of its use. In Rajasthan, while the traditional *kundis* met potable water supply, tanks and other structures met other household uses.

Another option is to provide a certain minimum level of potable water at low prices which can be used for drinking and cooking while the price of the remaining water use by households can be sufficiently increased to discourage indiscriminate use and wastage.

In rural areas, water pricing should be left to user committees and Panchayati Raj institutions to decide and implement.

■ **Legal empowerment**

Several states have legal provisions that prevent rural and urban communities from undertaking water harvesting activities. There is a need to study and document

these legal provisions and replace them with provisions that support community and household efforts for water harvesting. There is an equally pressing need to develop and/or strengthen legal provisions that help to prevent destruction of existing water harvesting structures.

■ Institutional mechanisms

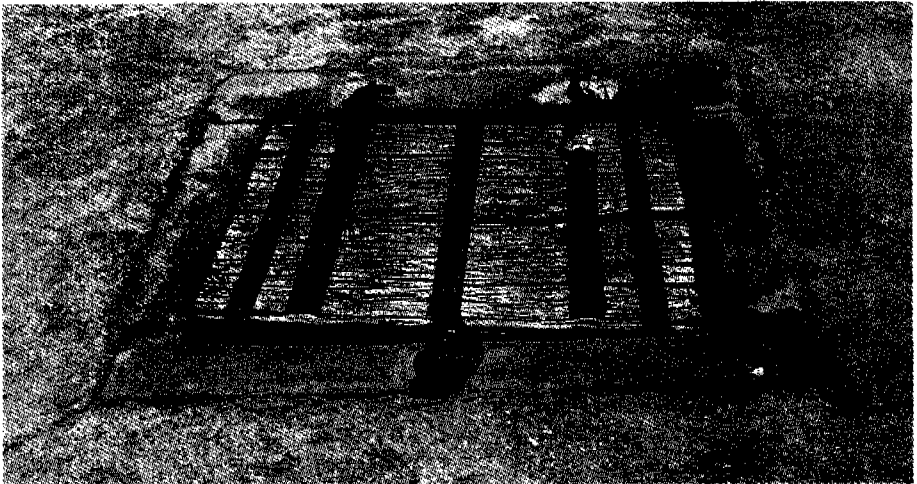
There is a clear need to think about the institutional mechanisms that are needed to promote water harvesting at all the following levels of Indian society:

- User level
- Village Level
- Urban Mohalla level
- District Level
- Municipality Level
- State Level
- Central Level

Each level should have a clear and defined role which helps to strengthen the role of other levels.

The 73rd and 74th Amendments to the Constitution need to be implemented effectively. State governments should constitute committees stipulated in the 74th Amendment even though there is political opposition to their formation.

For the kind of integrated development mentioned above, it is necessary that the Centre and the states recognise and accept the need to rationalise planning and administration under a unified authority at central, state and local levels. This authority should have representatives from the civil society, members of panchayats and



Kunds were usually covered with a lid from where water was drawn out with the help of a bucket. The picture shows how the people valued their kunds and kept them covered, sometimes even locked.

urban institutions, and officials from relevant ministries, such as those dealing with planning, urban development, rural development, health and environment. This authority should function under the prime minister at the Central level, the chief minister at the state level and the zilla parishad chairperson at the district level.

The purpose of these authorities should not only be to promote water harvesting in different ecological regions of the country but also to promote efforts to protect existing water harvesting structures. There is no institution today which deals with the protection of these waterbodies. The National River Conservation Authority, for example, deals only with river pollution. These authorities could be empowered under the Environment Protection Act of the Central government to issue appropriate directives to relevant authorities for the protection of lakes and other urban waterbodies. Otherwise a separate National Urban Lake and Waterbody Authority should be created to protect urban tanks and various other waterbodies. The Environment Protection Act has provisions to protect waterbodies and the catchment areas from encroachment or any activity which would pollute, impair, disturb or destroy them. It is now vital that this law be applied effectively.

Legal support should be provided to the public to help fight cases where these bodies are being destroyed. An apex committee or arbitrator should be appointed for the rapid settlement of disputes relating to waterbodies. In each district, a tribunal should be constituted to deal with water-related cases.

Water harvesting and protection of water bodies should become an important part of the country's water policy. The country's water policy should be evolved through a national-level public debate with the involvement of village communities, NGOs and all stakeholders concerned.

■ Scientific and technological research

It is necessary to promote scientific and technological research on water harvesting. Though our traditions have already given us an enormous wealth of technologies, there is a need to fuse them with modern knowledge and improve their efficiency. For example, techniques to improve runoff and reduce evaporation could greatly increase the efficiency of small-scale water harvesting structures. There is also a need to find cheap and effective water treatment technologies that can be used at the household and community level.

Following is a list of areas which need attention:

- Methods or models for quantification/evaluation of the effects of water harvesting and watershed projects. There is a need to involve universities for research in refining the design of water harvesting structures and determining their efficiency. Viable R&D projects can be funded by agencies like NABARD and CAPART.
- Artificial recharge of water harvesting from rooftop water or percolation ponds is being done without any quantification studies. There is need for R&D on

the quantity and quality of water which is retrievable.

- Methods for assessing the cost-effectiveness of water harvesting structures.
- Inventories of existing and traditional water harvesting structures should be prepared and should form the basis for planning in a district. It is essential that scientists and technicians work with local artisans to gain knowledge.
- Optimal scale of watershed planning.
- Benchmark surveys of virgin watersheds.
- Effect of percolation tanks on command areas.
- Water balance models which are appropriate to Indian conditions.
- Research on how technological devices can be used to bring rainfall prediction information to the village level, and how that information can be effectively utilised.
- Model of water conservation in which an individual farmer can practice with the farm as the unit.
- Quantification of the amount of surface and groundwater endowment of a watershed/village/community.
- Watershed information systems should be developed. All the existing data required for water harvesting should be digitised and put in an information support system.
- There is a need to bridge the information gap between research community, scientists, NGO's, government agencies and others, by undertaking a water harvesting project, in each agroclimatic zone and also in specific locations where groundwater is brackish or has high arsenic or fluoride contents.
- Research institutes or NGOs intending to work on sustainable agriculture should adopt the mandate of holistic development of 500 ha to 1,000 ha micro-watersheds located and work for overall development of the area with in-built monitoring and data-building mechanisms with a view to achieving an increasing trend in overall biomass production.
- Technology should be developed for wastewater recycling that is cost-effective and environmentally safe. This will not only safeguard water sources but also reduce the problem of wastewater disposal.

■ **Research on health effects**

There is also a need to undertake research on the health effects of small water harvesting systems used for drinking purposes. While rainwater is initially chemically and microbiologically clean, it may not remain microbiologically clean during the storage phase. This concern is often used to criticise the concept of water harvesting. The role of preventive and social medicine should be actively encouraged. But the ecology of disease spread in contained, small water supply systems is not the same as in centralised, large water supply systems. Cholera, for example, is unlikely to assume epidemic proportions through contained, small water supply



Urgent steps are necessary to study the health effects of small water harvesting systems used for drinking purpose.

systems. Disease organisms contaminating contained water supply systems will normally already be circulating in the household and its members will already be exposed to them.

Groundwater recharge using urban runoff could lead to a slow build-up of heavy metals and persistent organic pollutants in the groundwater as they are important contaminants of urban soils. Dumping of wastes, particularly toxic wastes, is already a punishable act. In rural areas, it is necessary to study the impact of agricultural pollutants on water harvesting structures.

There is, therefore, an urgent need to assess the health effects of small, contained water supply systems and urban groundwater recharge so that unnecessary concerns do not militate against the concept of water harvesting. And where health concerns are valid, appropriate regulatory and/or technological solutions will have to be found through research programmes.

There is also a need to produce home kits for testing water quality.

■ **Role of social science community**

The social science community must be encouraged to study the economic and social dimensions of water harvesting systems, including the documentation of property rights, management practices, and their effect on the lifestyle and traditions of the people.

State governments should support the study and documentation of the traditional methods of water harvesting, their history, viability and associated

religious beliefs. Inventories of existing and traditional water harvesting structures should be prepared and should form the basis for water resource planning for the district.

Research is needed on conflict resolution methods, institutionalisation of water management practices, how people manage their resources, the scientific basis, if any, of rituals and dictums associated with traditional water harvesting methods, and studies of the social impact of watershed projects.

It is also important for social scientists to study the success and failure of water harvesting projects and their economic viability, so that the management of these projects can gradually improve.

■ **Wastewater management**

Urban water management must go hand in hand with urban wastewater management, including appropriate water tariffs to encourage the use of treated wastewater, because these wastewaters can pollute the available water sources, including water harvesting tanks and rivers.

■ **Eco-regional specificity**

It must be emphasized that the water harvesting approach must be eco-region specific. Technologies and management systems must be specific to the local environmental conditions and constraints.

■ **Building a national movement**

Even as we address a number of recommendations to the State and other agencies, it is most important for all of us, as academics or other members of the civil society, to remember that the paradigm change we want to promote in water management will only come about if we can work together and form a powerful network of people who want to learn from each other and support each other in both their individual and collective tasks and objectives. The key objectives of the network should be to raise awareness about the potential of water harvesting, advocate policy changes and research programmes that support household and community-based water harvesting, and provide 'strategic assistance' to the members of the network in the form of information about best practices and experience, legal experts, or technical expertise, financial sources and technological options. There is, therefore, a need to build a nationwide network of water harvesters with appropriate regional and international links (see Annexure 2).

The ultimate purpose of the network should be to build a mass movement for household and community-based water harvesting.

ANNEXURE I

STATEMENT OF SHARED CONCERN

Issued by the participants of the CSE Conference on Traditional Water Harvesting Systems (New Delhi, October 9-11, 1990) and published in the Citizens' Fourth Report on the State of India's Environment entitled *Dying Wisdom: The Rise, Fall and Potential of Traditional Water Harvesting Systems*.



Water harvesting is an age-old concept in India. *Khadins*, tanks and *nadis* in Rajasthan, *bandharas* and *tals* in Maharashtra, *bundhis* in Madhya Pradesh and Uttar Pradesh, *abars* and *pynes* in Bihar, *kubls* in Himachal Pradesh, ponds in the Kandi belt of Jammu region, *eris* in Tamil Nadu, *surangams* in Kerala, and *kattas* in Karnataka are some of the ancient water harvesting, including water conveyance, structures still in use. Traditional systems are specific responses to ecology and culture in which they have evolved. Not only have they stood the test of time but they have also satisfied certain local needs in an environment-friendly manner. These systems emphasise eco-

logical conservation in contrast to environmental overuse of modern systems. Traditional systems have benefited from collective human experience since time immemorial and in that lies their biggest strength.

In India, rainfall is highly seasonal. Some 80 per cent of the country receives more than 80 per cent of its annual rainfall of 1,170 mm as liquid rain (not snow) during a three-month period. During rainy season, all the rain falls in about 200 hours; and, half of it, in 20-30 hours. Consequently, the runoff is high. Large river dams during heavy rainstorms store and distribute 20 per cent or less of the river runoff at the dam-sites. The rest of the river flow has to be released unutilised to save the dams.

The principle of water harvesting is to conserve rainwater where it falls according to local needs and geophysical conditions. In the process, groundwater is also recharged. Traditional water harvesting systems have met the domestic and irrigation needs of the people. The available historical and archaeological evidence suggests that effective systems of water management had been established and were

being operated by small communities in many regions of the country as early as the 4th century BC. In the Nanda kingdom (363-321 BC), rulers built canals and community-based irrigation systems. Sophisticated irrigation and water management systems were established by the Gond kingdom of central India together with the necessary social and administrative systems needed to sustain them.

It is possible that in the past, some of these water harvesting systems were not used to distribute water equitably. But there is ample evidence to show that community management of traditional systems ensured that basic minimum requirements of all individuals were met.

Not all traditional systems were small. Often big structures were also built to fulfill urban needs. However, the linkages of these systems with smaller ones (as in the Chola period, 930-1200 AD, and in medieval Vijayanagar) were well-balanced. Without eulogising the past, it can be said that traditional systems were more efficient in terms of delivery of water and returns on capital investment, and remains so today. Functionally, these systems are important as they have sustained communities through dry months and at times even stood the test of prolonged periods of drought. But sometimes, when the rains failed for years together, small systems broke down. This created the need for big systems. But the balance between small and big structures was worked out carefully. This cannot be achieved unless the entire community, both rural and urban, is involved in planning and implementing the system. The past can, therefore, provide us lessons for the future.

People want 'modern' systems because nobody likes to walk long distances to fetch water from a well or a tank if this facility is available by turning on a tap at home. Similarly, irrigation water available from a sluice or by switching on a pumpset is considered more desirable. Only when modern systems fail — taps go dry, dams silt up — do people think of traditional systems. There are, however, large parts of the country where modern systems will never reach because of the sheer costs involved. People in these areas continue to depend on traditional systems for both irrigation and drinking water. Another problem with modern systems is that they have increased the dependence of rural communities on government agencies which often fail to meet the basic needs of the people. Pipes are often laid in election years but water rarely flows in them.

The term traditional systems do not imply old or decrepit structures. These systems are distinct from large capital-intensive, state-managed structures. Modern systems, apart from their high monetary costs, have enormous ecological costs, too. Use of water generated by them usually goes against the basic norms of sound agroclimatic planning. Mining of groundwater through borewells is now extensive. Many government water agencies do not even understand the ecological nature of the water source they are tapping and assume that it will be available on a sustained basis. Even the sociopolitical impacts of modern systems have been adverse.

complete control over these resources, leading to largescale misuse;

- State promotion of individual beneficiary-oriented schemes and the accompanying decline of active community participation in the maintenance of traditional systems;
- Commercialisation of agriculture and the largescale cultivation of cash crops alien to local micro-climates, which work well for a short time but with serious problems emerging over the long term;
- Expectations of quick individual returns, resulting in a general decline in community cooperation;
- Changes in distribution and concentration of ownership of land and community resources in fewer hands;
- Emergence of state-sponsored institutions which were largely land-centred in their perspective as compared to traditional water harvesting systems which viewed land in relation to water and thus had a water-centred perspective;
- Unchanged state investment patterns which were developed during the colonial regime and neglected small water harvesting irrigation systems; and,
- Inability of government agencies to take a holistic view of water as a product of larger environmental management.

Modern attempts to restore traditional systems must reckon with the causes for their decline. They must also be based on a clear understanding of whether the conditions for their restoration are present today or not. If the 'community' supporting the traditional system no longer exists, it would be futile trying to build the structure first. Initial efforts would have to be made on building up the 'community' once again. Furthermore, social contradictions in some systems developed to the point that they collapsed. These contradictions will have to be carefully considered.

Specifically, some water harvesting systems were caste-based. British policies hardened caste hierarchies. Caste-based institutions became instruments of coercion and control. The British fragmented and divided communities to maximise revenue collection. Community-based systems were an antithesis to the British model of centralised rule. Perhaps, it was factors like these which contributed to the decline of water harvesting systems in Tamil Nadu. On the other hand, as in the case of the *kubls* of Himachal Pradesh and *kubals* of Jammu and Kashmir, traditional systems succeeded where the community participated by contributing voluntary labour and money to construct and maintain the structures.

The size of the system also played a crucial role. They were often kept small enough so that they could be easily managed and controlled by the community by pooling together its capital, labour and technical resources. This is in marked contrast to modern systems which depend on largescale allocation of State funds and an elaborate bureaucracy to manage them.

What successive governments have been promoting is a combination of largescale surface water systems, planned and managed by unaccountable

Traditional, community-based structures contributed to social cohesion and self-reliance. Often the responsibility of taking decisions and action was left to individuals, groups and local communities working together. This encouraged economic independence and optimal use of local resources at the micro-level. Traditional systems used low-cost, user-friendly techniques and were easily kept in good operational condition by local communities. Modern systems broke down the community and increased dependence on the government. The problem is compounded by the fact that modern systems, operating on market economy principles, are far from perfect in terms of their distributional impact. A few are favoured at the cost of many. Corrupt government agencies often fail to keep modern systems in good working conditions.

Water is a major force in economic growth. If development of water resources has to be sustainable, equitable and community-based, traditional systems have to be rejuvenated and developed.

■ Decline of traditional systems

Traditional water harvesting techniques have been severely eroded, thrown into disuse and even eliminated in most parts of the country. Since Independence, this deterioration has worsened despite the fact that the present system of centralised supply and management of water has failed to meet the needs of a large number of people. There are about 500,000 tanks in the country, mainly used for irrigation. Due to siltation resulting from deforestation and degradation of catchment areas, many of them have become unusable and groundwater recharge has also been affected. Deterioration of percolation tanks and encroachment of tankbeds in many parts have led to a sharp fall in the groundwater table and drying up of open wells containing drinking water.

Some of the reasons for the decline of traditional systems are:

- Growth in population and water demand, which could not be met through traditional technologies and systems; and at the same time, availability of modern and more convenient water supply through centralised storage systems like reservoirs and canals. The official emphasis on these systems led not only to a halt in the expansion of traditional systems but also to disuse and consequent deterioration of the existing ones;
- The centralised modern systems were initially installed in good faith to provide the people with a more convenient and abundant supply. But, over the years, the government machinery has developed an open bias in favour of these large complex and costly systems with low capital efficiency ensuring that power and authority stays with the bureaucracy and the community remains bonded to it;
- The fostering of greater dependence on the state itself for even small matters like maintenance of existing systems and the powers that government agencies have acquired through existing water and land resources laws which provide

bureaucracies, and numerous small, privately-managed wells operating within minimum State or community-imposed constraints. In doing so, they have undermined community-based institutions associated with the traditional water harvesting systems, and failed to recognise the desirability of community-based institutions for the conjunctive management of surface and groundwater in water-scarce regions. The beneficiaries of this 'policy' have been, in the case of large surface systems, irrigation departments, contractors, politicians and large farmers and, in the case of wells, large farmers and those in charge of subsidy programmes. The losers have been members of community-based organisations, especially poorer members, and community-based governance.

National policies should be worked out to encourage the growth of small water harvesting systems. They would depend on and contribute to community governance of natural resources. They would also greatly add to the efforts of the State to meet the basic needs of the people. Further, they are a part of our heritage.

In fact, the lessons learnt about the governance of traditional systems need to be extended to the planning, design and management of all forms of water development in India, including large canal systems and groundwater systems. Community-based government should be the starting point for all water and natural resource planning and management. This implies a massive reversal of present processes of decision-making.

There are hundreds of old and historic temples in almost each hamlet/village of Karnataka and every temple invariably has a *kalyani* (temple tank), most of which are today totally neglected and badly maintained. Administration of most of these temples has been taken over by the state government's mujrai department and in some cases, they remain with inactive boards of local trustees. It is unfortunate that maintenance works of these temple tank have become their last priority. The mujrai department or the board of trustees should earmark a decent portion of the temple revenue for desiltation and maintenance of *kalyanis* every year.

Many urban centres including major cities like Bangalore and Mysore in Karnataka had sprawling, historical tanks within the cities. They are indiscriminately being dried up and levelled for commercial advantages. A recent example is the drying up of Koramangala lake in Bangalore for construction of a housing colony for the third national games supposed to be held in 1997.

On the other hand, the natural flow of water during the rainy season has been drastically reduced because of increase metalling of roads and concrete topping of lawns by private citizens.

■ Technology of traditional systems

Water harvesting traditions, and particularly community-based traditions, were strongest in drought-prone areas of low rainfall in which topography has been sufficiently undulating to allow the construction of small surface water storages; and,

in high-rainfall, hilly areas, where topography was favourable to the construction of small diversion systems.

There is nothing backward about the technology of traditional water harvesting systems. They are not merely relevant, they are necessary, and, in some cases, even vital today. Some of these systems were neglected when more convenient systems were installed by the government. However, the failure of modern systems has resulted in attempts to regenerate and multiply the traditional ones. These efforts have not been entirely successful due to several reasons, including opposition from the entrenched bureaucracy. There is no clear policy regarding traditional water harvesting systems. While some attempts are being encouraged by the State, most are thwarted due to vested interests.

Modern water technologies have often been imported from the West without due regard to local specificities. These new technologies have had an enormous impact on water resources development during the last 50 years. Large scale development of canals, large dams and reservoirs have helped to boost Indian agriculture. But all of it covers at the most 30 per cent of the population and is already beginning to throw up serious problems. Others still depend on rainfed agriculture and traditional systems of *in situ* water conservation and harvesting. Indeed, some of these systems are technological marvels. Achieved without any of the sophisticated instruments or techniques currently used by engineers, the end result of the systems, that is, providing water, was often more reliable and durable than the 'modern' systems. Apart from using local materials and labour, the techniques skillfully manipulated the micro-environment to serve the needs of the people over several generations.

■ Catchment areas

Traditional systems are usually related to their environment in an organic and holistic manner. The catchment areas of traditional structures, basically village common lands, were looked after by local communities with care and a large part of the village biomass needs were met by them. Grazing in certain seasons, use for toilet purposes or dumping of animal carcasses was socially prohibited. The entire community knew that its water harvesting system would die if the catchment area deteriorated or the tankbed was encroached upon. If catchment areas of traditional systems are maintained properly and new ones installed wherever feasible, then despite mounting population pressure they can sustain a large part of the people's water needs. Modern water management systems have failed to integrate water management with care for the catchment areas.

■ Traditional vs Modern

Traditional water harvesting may not be sufficient for today's needs. In many areas, the traditional systems have been irretrievably destroyed. As such, a healthy mix of

the small and traditional, along with the large and modern is needed. But the first priority should be on small, localised traditional systems; large systems should use only the surplus water left after the small systems have been built. Big, modern systems, in principle, are technically similar to the traditional ones. Canals are simply big, long *kubls* (diversion systems). Dammed reservoirs are large irrigation tanks. The scale, however, makes a lot of difference in the management and usefulness of a system to the community. Social and economic conditions over large parts of India are such that only traditional systems are appropriate. This is being increasingly realised with the repeated failure of government works. Moreover, our choice between traditional and modern water systems should not be governed by explicit factors alone. Intangible benefits such as soil and water conservation must also be taken into consideration.

■ Upgradation

Traditional systems, in technological terms, are good. They have stood the test of time. There cannot, therefore, be any upgradation through research and development, unless the systems are well-documented and understood. Inputs from modern scientists and managers will not be productive otherwise. Modern water managers have shown little interest in traditional systems. Their initial involvement should be more as students trying to learn from them. Technical changes to the extent that they are necessary and desirable, should follow only after extensive discussions with the community based on the principles of participatory research.

■ Water rights

The most striking feature of traditional water harvesting systems is that the people had the right to construct and manage them. There is ample evidence throughout the country to show that, historically, even when the State financed the construction or repair of water structures, some of which were quite big, the ultimate responsibility of devising the micro-level distribution and maintenance systems were left to the local communities. Thus, the Chola officials (930-1200 AD) participated in village affairs more as advisors and observers rather than as administrators.

Some of these systems of rights and management were left intact even by the British, perhaps by oversight. The community, in many cases, ensured equal access to water to all its members, on the basis of needs. In the Kumaon hills of Uttar Pradesh, for example, customary water-use practices and rights were uniform for everybody. All castes, communities and individuals had equal rights to construct and manage irrigation systems. Legal changes in 1975, however, took away the jurisdiction of individuals and village communities over all water sources and placed it with the government. In Jammu and Kashmir, many traditional *kubals* were taken over by the government but as it failed to manage them, these

traditional systems were totally obliterated causing difficulties to the rural communities. In Kerala, too, an adverse impact on water rights of individuals was felt when energised pumpsets were introduced in the 1960s. Hence, through various processes, the State has usurped the rights of individuals and communities and replaced them by its own management policies. The consequent decline in the benefits provided by the traditional systems has ultimately led to mass alienation. Not that this did not happen in the past. However, historical evidence indicates the repercussions of such moves — in many cases the State itself collapsed.

There is a need to study and understand traditional water rights systems that existed in different parts of India — from Jammu and Kashmir to Nagaland — and revive them where necessary and appropriate. For instance, in Jammu and Kashmir, according to the traditional law of priority, upstream villages had prior rights to use water from a stream. This is a well established practice in the state and traditional rights are well respected.

Currently, water rights is an extremely controversial issue. Disputes over surface waters often result in litigation and violence. State agencies invariably claim monopoly over all significant streams even though groundwater is, by and large, free for anyone to use. A scheme of water rights is crucial to encourage maximum water harvesting and optimal use in an equitable manner. The most important issue before water planners or resource managers is to define and restore community rights over water resources and curtail the State's interference if traditional systems are to be revived. There is a need to limit or put ceilings on water-use, like that on land, to ensure equity. Moreover, land rights and water rights need to be viewed together. However, the ultimate operational modalities of these ceilings can be best worked out by the communities themselves.

A scheme of water rights should be incorporated into the Constitution after extensive debate and discussion. As a general principle, the planning and development of all water resources should be such that it is equitable and accessible to all, irrespective of community, caste, creed or sex. As this entails treating water as a common property resource, the necessary rights have to be looked upon as common property rights.

■ Individual rights

Individuals and households ought to have the right to harvest all the precipitation (rain and snow) that falls over their house, property or land, and store it in containers or other systems built, owned and maintained by them. They will, however, not have the right to take any water from the underground aquifer without the permission of the community or from a stream or any body of surface water that depends on inflows from catchments beyond the limits of privately-owned property. This right will encourage surface water harvesting. The use of the harvested rainwater, however, shall be such that similar rights of other individuals are not

compromised in any way, groundwater recharge is not affected and water sources do not get polluted.

■ **Community rights**

The traditional rights for water should be restored to the local communities. The local community, represented by an appropriate institution, be it a *gram sabha*, *gram panchayat*, *pani panchayat* or a municipal committee, will have absolute right on all rainwater that falls over the common lands of the community, local aquifers, streams and unharvested surpluses from private properties or government lands. This right will be exercised on behalf of all members of the community and with every member being treated as an equal partner in all benefits and costs. Costs can be shared according to two principles — that of equal benefits and equal payments or ability to pay. The abiding principle will be decided by the community.

The success of irrigation wells in tank commands in southern India is related to the degree of recharge from the tank and, hence, desiltation of the tank and management of the tank catchment for reduction in soil erosion become very important. This raises questions of property rights and the obligations of community institutions. If the downstream farmers have the right to use groundwater from their wells which lie in a tank command, the upstream farmers may not have any incentive to undertake improvements in the catchment areas. Groundwater and surface water users within the tank command thus have an obligation to participate in tank management. For instance, desilting the tank once in two or three years will not only increase the tank capacity to hold water but also help in increasing groundwater recharge.

■ **Resolution of conflicts**

Resolution of conflicts and disputes between settlements or communities over the use or misuse of common water resources should take place through institutions of the community instead of State bodies. The principles of resolving such issues are best decided by the communities concerned but broadly speaking riparian rights can be one such principle. All efforts by the State authorities to discourage water harvesting by communities need to be condemned.

■ **State rights**

A State-sponsored river basin authority will have the right to apportion or sell water, harvested or drained from government land and unutilised surpluses on an equitable basis. This authority will work in conjunction with a national body on traditional water harvesting institutions. Project planning and cropping patterns should be such that they can cover as extensive an area as possible. Water made available by the State should augment community systems but in no way should the latter be adversely affected. In river basin systems, the community of water

users should be seen as the primary units of water management and the river basin authority itself should be subordinate to the collectivity of water users.

■ **Investments in water harvesting systems**

Neglect of investment in traditional water harvesting systems is a continuing legacy of the British Raj. Rehabilitating traditional water systems may require levels of investment much beyond the community's capacity. This is because there is very little finance available with the rural communities. State financing becomes relevant where the rural community can barely meet its basic needs. But State investment should be carefully subordinated to and integrated with the interests and decisions of the local communities. Furthermore, investment planning should have a micro-level focus, preferably a watershed perspective. In addition, it is important to note that not all rural communities are poor. In fact, past efforts at resource mobilisation from rural communities have been very poor and this situation must change in the future. Every effort must be made to mobilise investment resources from the rural community itself and to the maximum extent possible.

■ **Human resources**

There is a lack of data on comparative costs and benefits of traditional and modern systems and the need for collecting such data is evident. There is, however, a widely shared belief that traditional systems require low levels of financial investments. The communities may willingly share these investments if they could own and manage the assets created.

Traditional water harvesting systems cannot be managed in isolation from other systems of community life. Holistic village planning, that is, planning of all village natural resources (land, forests, water and people) is essential. Investments will have to be made not only in physical structures but also in human resources as desired by the community. Major investments will also have to be made in training people who can interact with the communities and negotiate on their behalf with the government.

■ **Community maintenance and subsidies**

Finances for the initial construction and rehabilitation of the structure should come from the community as much as possible. At least 25 per cent can be obtained from the community, provided the investment planning for rehabilitation is undertaken by the community itself. State agencies and other external agencies should only play a supportive role. The exact modalities of financing and cost recovery should be best left to the community. The community must contribute effectively at all stages of the project. While State subsidies may be necessary, their level should be decided according to the community needs and regional specificities. Furthermore, greater emphasis has to be on subsidies to the community rather than on private subsidies to individuals.

■ **Management of traditional systems**

The local community should play the principal role in managing traditional water harvesting systems. The role of the State has to be kept to a minimum. The emphasis was not on community participation but on community governance. This implies not merely the social management of a water harvesting structure handed over by the State but the involvement of the community in both its planning and implementation.

Developing community institutions to construct and manage traditional water harvesting systems is a difficult task. No uniform model or existing institution can be recommended for this purpose for the country as a whole. Wherever possible existing institutions can be used to serve as a nucleus or catalytic agency. But in all likelihood new forms of participatory institutions will have to be evolved. Processes and structures for evolving such organisations and institutional forms should emanate from the grassroots rather than from above but legal support for such institutions will be vital. In evolving appropriate organisational forms for different parts of the country, parameters which ought to be taken into account are the nature of the existing water harvesting system, historical traditions in the area, governmental policies and their effects, sociopolitical factors, and the water availability demand relationships in the system. Since information on these factors and their interrelationships are lacking, more research than hitherto thought will have to be undertaken.

The ultimate should be to build up a community-based institution for conjunctive surface and groundwater management. It is arguable that the biggest threat to community-based surface water management systems will increasingly come from private groundwater exploitation.

■ **Desired goals**

Regardless of what was the nature of Indian rural society in the pre-British and British periods, many villages today are still divided along lines of class and caste. For evolving institutions to ensure community participation, equitable distribution of surface and groundwater, and class- and caste-free management is a difficult but a necessary goal, and these parameters should be incorporated in evolving appropriate organisational forms for constructing and operating traditional water harvesting systems. With the creation of suitable organisations and specification of guidelines and bylaws governing their working, these organisations should have the right to penalise offenders breaching agreed norms.

■ **Inter-settlement resource sharing**

While sharing water resources with neighbouring settlements, the general guideline would incorporate the principle of riparian water rights. In case of conflicts, efforts should be made to settle these through inter-village or inter-settlement peace com-

mittees. Failing this, they should be settled through the courts. The latter, however, is an extreme step and no effort should be spared to avoid it.

■ **Community and State relations**

The balance between community management and the role of government will vary from situation to situation. In principle, governmental intervention in the working of such systems should be very little. The objective of irrigation for agricultural development necessitates systems to be self-sustainable within the ambit of community management. If periodic rehabilitation of systems becomes inevitable to attain self-sufficiency, governmental intervention may be needed to some extent. Such intervention should not result in the government taking over the management of the system from the community.

The State's role in improving the management and performance of traditional systems should be through promotion and extension, like a counselling wing. This wing should provide advisory help for the management of traditional systems and for the upgradation of the structures. This counselling wing should have additional responsibilities to refine and update data on the technology and management of traditional systems, information dissemination and extension services necessary for improved irrigation management.

■ **National body**

A national body to support and coordinate the regeneration of traditional water harvesting structures by local communities is needed. But this body should not be allowed to replace community control over the structures created or regenerated. At best, it will provide broad management principles more as guidelines, and act as an apex body to set government policy, and ensure coordination between various government departments. To enable successful water harvesting in traditional ways, clear laws to prevent overexploitation are necessary. The national body should also fund research on traditional systems to evolve new organisational and institutional mechanisms and help in the development of technologies for upgradation of traditional water harvesting structures.

■ **Domestic water supply**

Traditional systems have provided drinking water to Indian villages and towns over centuries. Even today, thousands of villages and numerous towns depend on them for domestic water supply. Traditional systems also play an important role in areas where groundwater is saline or polluted due to human activity. The decline, in many cases, has set in as a result of neglect of traditional systems due to the presence of piped water supply. Often improper understanding of a traditional system has killed the very system. Increasing cases of taps going dry has even made people to revive the old systems. These attempts are frequently thwarted by the State.

The pattern of urbanisation in the post-Independence period has also contributed to water scarcity. Traditionally, settlements developed near water sources. At present, water has to be piped from distant sources to supply mushrooming satellite towns. Wastage of water and energy resources and unnecessary pumping operations are very common. When the distant source becomes inadequate, efforts are made to locate yet another. If the source is a dammed reservoir, the people around it often tolerate the export of water. However, if the supply is pumped groundwater which causes the water table to fall, local people resent it strongly.

■ **Holistic policy**

Holistic domestic water policy is absolutely essential as a part of the land-use and management of a region. This should not be isolated from the general water supply of the area. All individuals, irrespective of whether they reside in villages or towns, should be treated as equals. The existing duality in the national urban and rural domestic water policies must be removed, especially the underlying presumption that domestic water requirements are much less in villages.

■ **Government role**

Traditional water harvesting systems can meet the domestic water requirements of our towns and villages if used in conjunction with modern systems where necessary. The government should be perceived by the people as a promoter of water supply systems (both traditional and modern) and not as a munificent provider of water. This necessarily entails the participation of users in water planning and management processes. The State's role should be limited to the provision of technical advice and should raise funds at market rates when desired by the local community. The need for the community to feel a sense of ownership, responsibility and involvement in the management of the systems is necessary for their success.

Even during the initial outlay which may be supported by State agencies, the systems should be sustained by the community. The promotion of the judicious use of water, built into the cultural matrix of traditional systems, needs to be promoted in areas of water scarcity. This could also be encouraged by water rates that reflect the cost and scarcity factors involved. The final decision on this, however, should lie with the community.

The role of voluntary organisations in mobilising and organising communities to regenerate and develop traditional water harvesting systems needs to be stressed. Local youth, including college and school students, can be actively involved in this process. The training of government officials and technicians to appreciate the value of traditional systems and wisdom is vital. This can only happen when they realise the shortcomings and failures of modern systems which may arise as a result of shortage of energy, breakdown of pumps or drying up of a water source due to overuse. The use of appropriate technology using local materials also

needs to be stressed. Modification of traditional technologies to reflect altered demands within the changing social set-up should be encouraged. However, it is necessary to ensure that these improved techniques do not make the community dependent on science and technology inputs from trained government personnel who often fail to deliver the goods.

■ **Collection of rainwater**

It was felt that *in situ* collection of rainwater is desirable as water contamination is low. Moreover, expensive transportation costs are eliminated. Long distance transport of water for community use should be discouraged, especially if it leads to inequitable distribution of water between different village communities. Habitations should, as far as possible, be sited keeping water availability in view.

■ **Water conservation**

Domestic water is not utilised fully and nearly 85 per cent to 90 per cent of the water is returned as sewage, sullage or drainage. With appropriate treatment, this can be used for irrigation, groundwater recharge or even recycled for domestic use. All such possibilities should be explored before going in for long distance import of water. Another equally important way of optimising water resources for irrigation usage is by promoting drip and sprinkler irrigation methods.

■ **Community jurisdiction**

Traditional water harvesting systems often collect water that runs off large catchments and is then used for drinking. Community institutions must have a say in deciding whether a polluting activity can be sited in the catchment areas of traditional systems, regardless of whether this catchment area covers government land or not. The location of an H-acid (a highly poisonous chemical used for making black dyes) factory in Bichri village near Udaipur has polluted the entire groundwater reserves of the village. The blood-red waters of the wells will not be potable for years to come. The community's protests against the siting of the factory had fallen on deaf ears. Very little has been done by the government to provide alternate sources of water even after the pollution has taken place. The apathy must be condemned in the strongest terms and the rights of communities to participate in decisions that pose a threat to their domestic water sources must be respected.

Further, multi-disciplinary research on traditional water harvesting systems is needed. Deeper and wider investigation of the social, economic and managerial aspects of these systems across the various ecosystems of the country is necessary. The environment in the past was not static but very little knowledge exists about how people adapted to change. To understand this comprehensively, micro-level studies would be necessary in each agroclimatic zone.

It is important to emphasise that research tools themselves might need

modification as they might not be appropriate to categorise the knowledge possessed by the people. One example of this is the case of water diviners in various parts of the country. These people can indicate the exact location and depth at which groundwater is available. Today the tendency is to dismiss them as fakes without verifying their claims. Another example is the conventional cost-benefit analysis which does not give any importance to cultural parameters or scarcity values a society attaches to water. Methods of project evaluation need to be revised.

To combine traditional technologies with the modern, a wide body of realistic data (on groundwater resources, for example) has to be collected. At present, there is a heavy reliance on thumb rules. Almost no information exists on the linkages between big systems and small ones, both in the past and at present. Women play a pivotal role in the operation and maintenance of traditional systems but they do not figure in any research work.

State finances should be invested in the research and development of all aspects of traditional systems. As a first step, a comprehensive list of local names and descriptions of different systems throughout the country needs to be compiled and categorised.

Anil Agarwal	G D Agarwal	Rakesh Agrawal
Rajat Banerji	B C Barah	P K Chhotroy
Ishwar Daitota	Dharampal	M K Dhavalikar
Dunglena	A Ali Firdausi	Harnath Jagawat
Anil Kumar	Anupam Mishra	Amit Mitra
S M Mohnot	R K Mukherjee	M G Nagaraj
Sunita Narain	D N Narayana	B M Pande
U C Pande	Ganesh Pangare	Ganesh Prasad Kala
P S Ramakrishnan	M S Rathore	Anumita Roychowdhury
V B Salunke	Nirmal Sengupta	Anju Sharma
Rajendra Singh	K E Sreedharan	M S Vani
Rohan Wickramasinghe		

ANNEXURE II

NATIONAL WATER HARVESTERS' NETWORK

■ Introduction: The Challenge of Water

One of the biggest environmental challenges that India faces in the coming decades is that of balancing its increasing demand with the diminishing availability of water.

Increases in population coupled with the ongoing processes of industrialisation, urbanisation and agricultural development are, on one hand, leading to an ever-increasing demand for water, and, on the other, a decreased supply of freshwater, especially in the absence of effective mechanisms to regulate pollution. The future scenario is one characterised by overexploitation of water resources, decreased accessibility to clean water, increased competition for and potential of conflict over water resources.

Major institutional, policy and technological initiatives are required to ensure an efficient, socially equitable and environmentally sustainable management of our water resources.

■ The importance of water harvesting

There is only one source of freshwater and that is precipitation, whether it is in the form of snow that makes glaciers or rain which ultimately flows down as streams and rivers and recharges the groundwater.

A major reason for the growing overexploitation of water resources is the current stress on riverwater and groundwater to the neglect of rainwater and floodwater, the availability of which is far greater.

India — one of the wettest countries in the world and yet a country that is facing a growing water shortage — receives 400 million hectare-metres (mham) of precipitation, primarily as rain. But we use only a small part of it. By 2025 A.D., India is expected to be using 105 mham. If all this water use was to be met from rivers and groundwater systems, riverine ecosystems and groundwater resources will come under extreme stress, as is already being noticed across the country. Rainwater harvesting can not only provide a source of water to increase water supplies but also involve the public in water management, making water management everybody's business, it will also reduce the current demand on government institutions to meet water needs, reduce the need for government subsidies, and help everyone to internalise the full costs of their water requirements, thus encouraging the public to be more conserving in its water demand. *And in rural areas water harvesting should also be seen as part of an integrated programme for sustainable development of land and water resources on a watershed basis whose objective is to improve total biomass output.*

Water harvesting *and integrated land-water management* is not new to India. The art and science of 'collecting water where it falls' is ancient but this 'dying

wisdom' needs to be revived to meet our modern freshwater needs adequately, equitably and sustainably. Our aim and, in fact, our responsibility is then to help revive and propagate this traditional wisdom which holds the key to conservation of water in the future *and modernise it with inputs from science and technology*. This is the one point agenda behind the establishment of the National Water Harvesters' Network (NWHN).

■ **What does water harvesting mean?**

It means capturing rain where it falls or capturing the run off in your own village or town. And taking measures to keep that water clean by not allowing polluting activities to take place in the catchment.

Therefore, water harvesting can be undertaken through a variety of ways:

- Capturing runoff from rooftops
- Capturing runoff from local catchments
- Capturing seasonal floodwaters from local streams
- Conserving water through watershed management

These techniques can serve the following purposes:

- Provide drinking water
- Provide irrigation water
- Increase groundwater recharge
- Reduce stormwater discharges, urban floods and overloading of sewage treatment plants
- Reduce seawater ingress in coastal areas

■ **The Mission of the Network**

- To harness the power and knowledge of individuals and communities to revive and develop the ancient techniques of water harvesting together with modern inputs from scientific knowledge for conservation and better management of our freshwater resources.
- *To serve as a forum for advocacy for appropriate changes in policies, programmes and institutional structures.*
- *To help the civil society to act as an effective pressure group.*

■ **Goals of the Network**

To accomplish this overreaching objective, the network proposes to achieve the following goals:

- Build COALITIONS by bringing like-minded people together.
- Promote COMMUNICATION amongst them by providing a forum that facilitates the coming together of people and exchange of ideas and perspectives.
- Create and disseminate INFORMATION on *exemplary action and technologies*.

The network seeks to create 'water literacy' and provide informational support to the researcher, writer and practitioner of water harvesting. It also seeks to work towards improving access to information by serving as a clearinghouse for information on activities, issues and 'technological' developments related to water harvesting.

- EDUCATE the public and policy makers.
- EMPOWER the marginalised people and their knowledge systems in order to help them CONSOLIDATE their power and efforts.
- ADVOCATE relevant changes in policy and legislation.
- Provide INFORMATION about technical, legal and financial support and, if possible, provide these different types of support directly.
- Provide SUPPORT to local initiatives to overcome obstacles and impediments in implementation.
- *Work with all levels of the government, especially Panchayati Raj institutions to PROMOTE water harvesting at the local level.*

The network will take special care to reinforce and not replace existing local initiatives.

■ Activities of the Network

In order to accomplish these goals the network will undertake the following activities:

- Produce a newsletter.
- Create and maintain a database on people, *projects, organisations and technologies related to water harvesting.*
- Create a network website.
- Establish a clearinghouse to provide technical, legal and financial information.
- *Document on an on-going basis the experiences and lessons learnt of outstanding government and non-governmental efforts.*
- *Establish a documentation centre of educational and training materials prepared by field action groups for easy dissemination.*
- *Promote active links between field action groups and research, professional and academic institutions.*
- Promote cultural connections and rituals associated with water and water harvesting.
- Organise public meetings, workshops and exhibitions around the theme of water harvesting.
- Organise a volunteer network in support of water harvesting.
- Develop links with people involved in water harvesting in South Asia and other parts of the world.
- Organise training workshops.
- Set up investigative missions/working groups on important issues raised by

local initiatives.

- *Documentation* of on-going research and study on specific issues of relevance.
- Organise regional and national conferences.
- *Organise interactions with government and other policy makers.*

■ **Membership of the network**

Membership of the Network is open to all (from within India and abroad) on payment of a membership fees.

Membership should be on payment. The annual membership fees should be a minimum of Rs. 100 (US \$10) for individuals, Rs. 500 (US \$30) for institutions and Rs. 5,000 (US \$125) for corporations. The exact fees can be decided by the steering committee.

■ **Structure of the network**

The structure of the network should be one that fosters promotion of water harvesting.

The structure should be one that is flexible and evolves as the needs, aspirations and the capacity of the network grows. It should also be a structure that can balance the need for infrastructure (and financial requirements for it) with that of accountability.

Small regional level networks should be invited to become a formal part of the proposed Water Harvesters' Network.

■ **Finances of the Network**

The aim is to make the network self-financing. However as this would not be possible immediately on the basis of membership subscription, support from agencies, national and international agencies, would be needed.

At both Central and the state level, an existing organisation can host the local office of the network.

■ **Governance of the Network**

The membership of the network will form the general assembly (GA), which will appoint the steering committee (SC).

To initiate the process, an ad-hoc steering committee will be set up to work out the details of the management of the network. It will also approach potential and willing institutions and individuals for membership of the NWHN. Members will represent interested individuals and various stakeholders from the water community, especially those engaged in water harvesting and related issues. The conference organising committee of the CSE Conference on Water Harvesting: Technology, Policies and Social Mobilisation will constitute the ad-doc steering committee. The ad-hoc steering committee will organise the first general assembly at which a new

steering committee will be appointed.

A small secretariat of two to three persons who are paid full-time staff can be set up to support the network. But all other participants and office bearers will be honorary.

■ **Cooperation with other networks: nationally and internationally**

Cooperation in an endeavour such as setting up and running a network is of key importance. People from related networks can be co-opted onto the steering committee of the NWHN in due course.

The periodic conference(s) of NWHN would be an ideal way of getting people from related national and international networks together.

■ **Registration of the network**

The network will remain an informal one till an appropriate decision is taken by the steering committee.

■ **Secretariat of the network**

The ad-hoc steering committee will nominate an institution to be the secretariat of the network.

■ **Evolution of the network**

The network will be both rural and urban. It is envisaged that this will eventually become a mass-based network. But generally the approach should be to take one step at a time and see how the network evolves.

■ **Working Group on need to establish a National Water Harvesters Network**

Co-Chair: V B Salunke	Co-Chair: Lawrence Surendra	Anna Hazare
Dr G N S Reddy	Dr K R K Reddy	Dinabandhu Karmakar
Katadimrei Panmei	Y Surchandra Singh	L Jelsyam Singh
A Vaidyanathan	S R Nalli	Akshay Kaul
Narendra Balu Patil	M Srinivas	Hasmukh Devmurari
Manubhai Mehta	Padma Jayaveera	Uma Shankari
Mahesh G Kankal	Amit Mehrotra	A Kalimuthu
Suryabhaan Khubragade	G T Bhimte	R Sreenivasan
Anand M Bhattarai	B J Vasoya	Ajay Dolke
Reba Paul	Nafisa Barot	Ajay Desai
Suryakant Kulkarni	Rajat Banerji	

LIST OF CONFERENCE PARTICIPANTS

NATIONAL

Andhra Pradesh

1. Mr B N Chetty, President, Janavikas Society, D No 45-24-G 30 Ashok Nagar, Kurnool.
2. Dr C Ramachandraiah, Lecturer, Member, Urban Geography, Centre for Economic and Social Studies, Begumpet, Hyderabad 500016.
3. Mr Chandrasekhar, Watershed Development Team Member, Civil Engineering, Andhra Pradesh Mahila Samata Society, 39 Aravinda Nagar Colony, Domalguda, Hyderabad 500029.
4. Ms Deepa Sundera Rajan, Consultant, Andhra Pradesh Mahila Samaj Samiti, 39 Aravind Nagar Colony, Domalguda, Hyderabad.
5. Mr Hanif, Watershed Development Team Member, Andhra Pradesh Mahila Samatha Society, 39 Aravindanagar Colony, Domalguda, Hyderabad 500029.
6. Jasveen Jairath, Consultant, Society for Participatory Development, 6-F Maypair Apts, Road No 2, Banjara Hills, Hyderabad.
7. Dr K Ramakrishna Reddy, Associate Professor Management, Sri Krishna Deveraya Institute of Management, Sri Krishna Deveraya University, Anantapur 515003.
8. Dr K L Vyas, Convenor, Saves Lakes of Hyderabad, Flat No 112, Plot No 5344, Sowmya Apartments HUDA Complex, Saroor Nagar, Hyderabad 500035.
9. Dr M S Kodarkar, Secretary, Indian Association of Aquo Biologist, C/O Dept. of Zoology, Vivek Vardhini College, Hyderabad 500195.
10. Mr M Srinivas, Chief Executive, AWARD, Project office, 1-3-151 Shastri Nagar, Nirmal 504106.
11. Dr R N Athavale, Scientist, National Geophysical Research Institute, Uppal Road, Hyderabad 500007.
12. Thakur Rattan Singh, Lecturer in Zoology, Environmental Biology (Ecology), C K M Arts & Science College, H No 5-11-590, P O Vidyaranya Puri, Warangal 506009.
13. Dr Shourie, Lecturer, Vice Chairman, Life Sciences, Organisation of Elevation of the Rural Downtrodden, 12-11-1492 Bondhanagar, Secunderabad 500361.
14. Mr Sleeva Gallell, President, Social Science, Laity Service Centre, P B No 119 PC Building, Hyderabad 500001.
15. Uma Shankari, Venkataratnapuram, Valliveddu Via Damakhemu, Chittoor 517152.
16. Dr V Gangadhar, Reader, Department of Anthropology, Sri Venkateswara University, Tirupati 517502.

Bihar

17. Mr Enos U K Soren, Programme Coordinator, Rural Development-Northern Evangelical Lutheran Church, Bandorjori Mission, Dumka 814101.
18. Mr Nikudim. Marandi, Coordinator, Rural Development-Northern Evangelical Lutheran Church, Bandorjori Mission, Dumka 814101.
19. Mr P R Mishra, Patron, Chakriya Vikas Society of Hill Resource Management School, Daltonganj 800101.

Delhi

20. Mr A T Dudani, Inter Scientific Society Citizen Concess, C/35 Panch Enclave, New Delhi.
21. Mr A Kumar, Deputy Director, Ministry of Environment & Forests, 2-602 Timarpur, New Delhi 110054.

22. Mr A A Rasheed, Senior Technical Assistant, Indian Institute of Technology, New Delhi 110016.
23. Dr A Singh, Principal Scientist, Water Technology Centre, Indian Agricultural Research Institute, PUSA Campus, Karol Bagh, New Delhi 110012.
24. Maj Gen A P S Chauhan, 6090, B8 Vasant Kunj, New Delhi.
25. Mr Akshay Kaul, Consultant, Ecological Planner, T V B School of Habitat Studies, 203 South Ex. Plaza - I, New Delhi 110049.
26. Mr Anil Agarwal, Director, Centre for Science and Environment, 41 Tuglakabad Institutional Area, New Delhi 110062.
27. Ms Anita Soni, Coordinator, Bhatti Mines, National Alliance of Peoples Movement, 15a/45 Via Karol Bagh, New Delhi 110005.
28. Mr Anupam Mishra, Environment Cell, Gandhi Peace Foundation, 221-223 Dendyal Upadhyay Marg, New Delhi 110002.
29. Ms Anuradha Chandran, Sanket Productions, FA 338 Mansarovar Garden, New Delhi 110015.
30. Mr B S Kalra, Scientist, Water Science & Technology, Water Technology Centre, Avenue II, IARI, Institute Campus, New Delhi 110012.
31. Mr Bharat L Gupta, Deputy Secretary & Deputy Advisor, Ministry of Rural Areas and Employment, 608 Block 11, CGO Complex, New Delhi 110003.
32. Mr Bijoy K Mishra, A-6 Sahyadri Apartments, 9-A IP Ext, Delhi 110092.
33. Mr Chander Choudhary, Member, Consortium of Scientist for Sustainable Development, E-227 Greater Kailash II, New Delhi 110048.
34. Ms Chitra Krishnan, Research Scholar, Department of Applied Mechanics, Indian Institute of Technology, Hauz Khas, New Delhi 110016.
35. Mr Darryl Jackson, Consultant, EFICOR, Post Bag No 21, Vasant Vihar Parivarthan Building, Mahipalpur, New Delhi.
36. Mr Deb Dutta Ray, Researcher, Centre for Science and Policy Studies, Jawaharlal Nehru University, New Delhi 110067.
37. Ms Divya Kashyap, Consultant, Technical (Land & Water), Ecotech Services, B-7/ Ext 115, Safdarjung Enclave, New Delhi.
38. Mr E V Jagannathan, Water Resources Engineer, the World Bank, 70 Lodi Estate, New Delhi 110003.
39. Prof Edwin Wells, Engineer, Inventor, Spring Garden College, A-15 Paryavaran Complex, Madangiri Road Saket, New Delhi.
40. Mr Gautam Vohra, Chairman, Development Research & Action Group (DRAG), 75 Pashim Marg, Vasant Vihar, New Delhi 110057.
41. Dr H P Ray, Associate Professor, Centre for Historical Studies, Jawaharlal Nehru University, New Delhi 110067.
42. Capt J S Gill, President, Marine and Oceans, Gill Maritime Consulting, A1/237 Safdarjung Enclave, New Delhi 110029.
43. Mr J P Pathak, Advocate, Supreme Court, 2 Lawyers Chambers, New Delhi.
44. Mr Johar Kanungo, Documentary File Maker, 1143/D-1 Vasant Kunj, New Delhi 110070.
45. Josna, Assistant Manager, Indo-German Social Service Society, 28 Lodi Institutional Area, New Delhi 110003.
46. Mr K T Chandy, Senior Fellow, Agricultural Education, Indian Social Institute, 10 Institutional Area, Lodhi Road, New Delhi.
47. Dr Kanchan Chopra, Institute of Economic Growth, University Enclave, Delhi 110007.
48. Mr Kittu, Rural Areas & Employment, Rajiv Gandhi National Drinking Water Mission, Paryavaran Bhawan, 9th Floor, CGO Complex Lodi Road, New Delhi 110003.
49. Mr L A Mandalia, Programme Specialist, Water Science, UNESCO, 8 Poorvi Marg, Vasant Vihar, New Delhi.
50. Mr M M Datta, National Professional officer, World Health Organisation, A Wing, Nirman Bhawan, New Delhi 110011.

51. Mr M Dhinadhayan, Assistant Advisor, Ministry of Urban Employment, New Delhi.
52. Mr M S Sodhi, Assistant Director, Grid Management Division, Ministry of Power, Central Electricity Authority, NREB Complex, Katwaria Sarai, New Delhi 110016.
53. Prof M P Srivastava, Department of Physics, Delhi University, Delhi 110007.
54. Ms M S Vani, Member, Development Centre for Alternative Policies, 62, Babar Road, New Delhi 110001.
55. Mr Mahendra Pal, Sr Programme officer, Agriculture Sector, Royal Danish Embassy, 11 Aurangzeb Road, New Delhi 110011.
56. Ms Mandira Mitra, Wilkinson Environmental Consulting, K-37 D, Kailash Colony, New Delhi 110048.
57. Ms Manisha Marwaha, Research Associate, Oxfam (India) Trust, B-3 Geetanjali Enclave, New Delhi 110017.
58. Mr Manu Bhatnagar, Advisor, Indian National Trust for Art and Cultural Heritage, Bharatiyam, Near Humayun Tomb Nizamuddin, New Delhi 110013.
59. Mr Mazumder, Assistant Adviser, Ministry of Rural Areas and Employment, Rajiv Gandhi National Drinking Water Mission, 9th Floor, Paryavaran Bhavan, CGO Complex, Lodhi Road, New Delhi 110003.
60. Ms Namrata Pathak, Project Scientist, Centre for RD&T, Indian Institute of Technology, Hauz Khas, New Delhi 110016.
61. Mr P U Francis, Charitas India, CBCI Building, Goleedakhana, New Delhi 110001.
62. Mr P G Menon, Executive Director, Institute of Materials Management of India, D-409 Defence Colony, New Delhi 110024.
63. Mr Pravin Kumar Choudhary, Sr Executive, GMC Project, Gill Naritime Port and Maritime Consulting, A1/237 S J Enclave, New Delhi.
64. Ms Priya Sen, Hon Secretary, Development Research and Action Group, 75 Paschimi Marg, Vasant Vihar, New Delhi 110057.
65. Mr Purabi Pandey, Chairperson, Search Educational Trust, I 5, Mahatma Gandhi Marg, New Delhi 110024.
66. Mr R P S Malik, Fellow, Agricultural Economics Research Centre, University of Delhi, New Delhi 110007.
67. Mr Raj Kumar Hooda, Government Boys Sr School, East Park Road, Karol Bagh, New Delhi.
68. Mr Ramaswamy R Iyer, Research Professor, Centre for Policy Research, Dharma Marg, Chanakyapuri, New Delhi 110 021.
69. Ms Rita Bhatia, Housewife, D-145 East of Kailash, New Delhi.
70. Mr Ritu Singh, Consultant, INTACH, Bhartiyaam, Nizamuddin, New Delhi 110013.
71. Mr Rohan D'souza, Research Associate, Delhi School of Economics, Delhi University, Delhi.
72. Mr S Rajagopal, Water Resource Specialist, the World Bank, 70 Lodhi Estate, Lodhi Estate, New Delhi 110 003.
73. Salathiel R Nalli, Project Development officer, Natural Resources Management Unit, EFICOR, Post Bag No 21, Vasant Vihar Parivarthan Building, Mahipalpur, New Delhi.
74. Ms Sandhya Venkateswaran, Indian Canada Coop office, D1/56 Vasant Vihar, New Delhi.
75. Mr Sanjay Gupta, Institute for Socio-Economic Development, H-18/16 2nd Floor, Malviya Nagar, New Delhi.
76. Mr Sanjay Kumar, Editor, Deshkal, A-14 Nehru Vihar, New Delhi 110054.
77. Mr Sanjay Maharishi, Film Maker, Sanket Productions, Fa 338 Mansarover Garden, New Delhi 110015.
78. Mr Sanjoy Hazarika, Reporter, Centre for Policy Research, 10 Dharma Marg, Chanakyapuri, New Delhi 110021.
79. Ms Shama Zaidi, Writer, Rajeev Sethi Scenographers, C-49 Niti Bagh, New Delhi.
80. Mr Shrikant Joshi, Director, Taru Leading Edge, U-12 S F Green Park Extn, New Delhi 110016.

81. Dr Sitiesh Bhatia, Reader, University of Delhi, Kalindi College, Patel Nagar East, Delhi 110034.
82. Mr Sunil Sharma, Project Manager, Innovative Technologies, 118 Vardhman City Centre, Near Shakti Nagar Under Bridge Ashok Vihar, New Delhi 110052.
83. Ms Sunita Narain, Dy Director, Centre for Science and Environment, 41 Tughlakabad Institutional Area, New Delhi 110062.
84. Mr Suresh Rohilla, Director (NHD), Indian National Trust for Art and Cultural Heritage, Bharatiyam, Near Humayun Tomb Nizamuddin, New Delhi 110013.
85. Ms Taranjot Kaur Gadhok, Senior Fellow, Human Settlement Management Institute, HUDCO Bhawan, IHC, Lodhi Road, New Delhi 110003.
86. Mr Tejinder Singh, General Manager, Osmosis Overseas Pvt Ltd, 4 Influence House, Zumdumpur, New Delhi 110048.
87. Mr Ujjwal Khanna, C-2-134 Phase 2, Ashok Vihar, Delhi 110052.
88. Usha P Raghupathi, Associate Professor, National Institute of Urban Affairs, Core 4-B IHC, Lodi Road, New Delhi 110003.
89. Dr V K Dixit, Programme Coordinator, Micro Irrigation, International Development Enterprises, C5/43, Safdarjung Development Area, New Delhi 110016.
90. Mr V K Thakur, Director Finance, Ministry of Defence, 1265 Sector XII, R K Puram, New Delhi 110022.
91. Ms Vibha Arora, Project officer, Research and Documentation, CARITAS India, C-15a Kailash Colony, New Delhi.
92. Mr Vijay Kumar, Sr Programme officer, Royal Danish Embassy, 11 Aurangzeb Road, New Delhi.
93. Mr Vijay K Sardana, Aga Khan Foundation, Sarojini House, 6 Bhagwan Dass Road, New Delhi 110001.
94. Maj Gen Vinod Saighal, Convenor, MRGG, 38 Babar Road, New Delhi 110001.
95. Mr Yogendra Chaudhry, Environment Analyst, Shriram Institute for Industrial Research, 19 University Road, Delhi 110007.

Goa

96. Mr Amar Heblekar, Range forest officer, M-2 Housing Board Colony, Ponda 403401.
97. Ms Meenal Heblekar, Research Fellow, Microbiology, Goa University, Taleigao Plateau.

Gujarat

98. Mr Anil C Shah, Development Support Centre, 2 Prakriti Apartments, Opp. Red Rose Restaurant, H L Com. Col Road, Navrangpura, Ahmedabad.
99. Mr B J Vasoya, Chairman, Water Management Forum, 10 New Vaishali Society, Opp Rajpath Club, Bodakdev, Ahmedabad 380054.
100. Mr Chhelbhai J Shukla, Director, Rural Development, Gram Swarag Shikshan Kendra, Gopaldham, Rajkot.
101. Mr Harnath Jagawat, Director, N M Sadguru Water & Development Foundation, Post Box 71, at Village Chosala, Dahod 389151.
102. Mr Hasmmukh Devmurari, Director, Rural Engineering School, Rojmal, Tal Gadhada (SN), Bhavnagar.
103. Dr Jayant S Solanki, Forest Officer, Forest Department, 21 Sevagram Society, Near Panchshil, Usmanpura, Ahmedabad 380013.
104. Dr K C B Raju, Advisor, Hydrogeology, Shri Vivekanand Research and Training Institute, Mandvi, Kutch 370465.
105. Dr Kiran D Bhatt, Project officer, GSFC Science Foundation, GSFC Research Centre, PO Fertilizernagar, Vadodara 391750.
106. Mr Manish Vaidya, B-60 Harsh Nagar Society, Sabarmati 'D' Cabin PO New Delhi

Colony, Ahmedabad 380019.

107. Mr Manubhai Mehta, Project Coordinator, Kundla Taluka Gram Seva Mandal, Water Resource Development Project, 'Mahavirkupa', Gram Sewa Co-op Housing Society Nr ST Depot Mahuva Road, Savarkundla 364515.
108. Ms Nafisa Barot, Utthan-Mahiti, 36, Chitrakut Twins, near Management Enclave Vastrapur, Ahmedabad 380 015.
109. Mr P P Bhatt, Project officer, Bochasanwasi Shri Aksharpushottam Public Charitable Trust, Shri Aksharpushottam Temple, Shahibaug Road, Ahmedabad 380004.
110. Mr Premjibhai Patel, Trustee, Vraksha Prem Seva Trust, Fulara Mill Godown, Furniture Gali, Rajmarg, Upleta 360490.
111. Dr S K Gupta, Scientist F, Earth Science Division, Physical Research Laboratory, Navrangpura, Ahmedabad 380009.
112. Dr Salil Mehta, Chief Executive, Utthan-Mahiti, 36, Chitrakut Twins, near Management Enclave Vastrapur, Ahmedabad 380 015.
113. Mr Shyamjibhai Antala, 'Rani Krupa', near Bus Stand, Dhoraji 360410.
114. Mr Tasneen Kharaliwala, Senior Programme officer, N M Sadguru Water Development Foundation, C/O Onali 1 Ranapurwala, 811 Nazami Mohallah, Dahod 389151.
115. Mr Vikas Singh, C/O Onali I Ranapurwala, 811 Nazami Mohallah, Dahod 389151.

Haryana

116. Mr Deendayal Sharma, Coordinator, Dehat Vikas Kendra, Dist. Mohindergarh, Dongra.
117. Mr Jaisingh Yadav, Coordinator, Samaj Vikas Kendra, Sohansara.
118. Lata Sharma, Supervisor, Dehat Vikas Kendra, Village Dongra Ahir, Dist. Mohindergarh, Dongra.
119. Mr Sunder Lal, Director, Social Centre for Rural Initiative and Advancement, Khori Centre, Khori 123101.

Jammu & Kashmir

120. Mr Chewang Norphel, Project officer, Leh Nutrition Project, Ladhak, Leh.
121. Major Gen G S Jamwal, President, J&K Paryavaran Samrakshan Sanstha, Paryavaran Kendra, Gadadhar Mandir Mabark Mandi, Jammu Tawi 180001.
122. Mr Mohammed Deen, Chief Project officer, Rural Development, Desert Development Programme, Ladakh, Leh.

Karnataka

123. Mr Ananda Mohan Bhattarai, Research officer, Centre for Environmental Education, Research & Advocacy, National Law School of India University, Nagarbhavi Post Bag No 7201, Bangalore 560072.
124. Mr G N S Reddy, Chief Programme Coordinator, BAIF — Institution for Rural Development (BIRD), 'Kamadhenu' P. B. No 3, BAIF Campus Tiptur-Hassan Road, Sharadangara 572202.

Kerala

125. Annie Preman, Ministry of Rural Development, Koshikoda.
126. Mr George Kutty Joseph, Director (Technical), Socio Economic Unit Foundation, IC 16/309 Esawaravilasan Road, PO Box 507, Thycaud PO, Trivandrum 694014.
127. Mr Isac John, Programme Manager, Technical Support Unit, Socio Economic Unit Foundation, B-1 New Block, Collectorate, Mallapuram 676505.
128. Mr K M Nambodri, Consultant, Team Leader, Water Resources Engineer, Socio

Economic Unit Foundation, IC 16/309 Esawaravilasan Road, PO Box 507, Thycaud PO, Trivandrum 694014.

129. Mr K P Preman, Assistant Dev. Commissioner, Rural Development, Government of Kerala, Collectorate, Kozhikode.
130. Dr K N Remani, Scientist & Head In-Charge, Environmental Studies Division, Centre for Water Resources Development and Management, P B No 2 Kunnamangalam (MBR), Kozhikode 673571.
131. Dr N M Nayar, Central Tuber Crops Research Institute, Sreekariyam, Thiruvananthapuram 695017.
132. Dr Srikumar Chattopadhyay, Scientist E-1, Centre for Earth Science Studies, PO Box No.7250, Thiruvikkal P.O. Akkulam, Thiruvananthapuram 695 031.
133. Fr Yesudas Kattunkathayil, Assistant Director, Alleppey Diocesan Charitable and Social Welfare Society, Post Box No 114, Alleppey 688001.

Madhya Pradesh

134. Mr Anil Yadav, Journalist, 7 Jain Pathshala, Ganj Vasoda, Vidisha Dist. 464221.
135. Mr G T Bhimte, 62-D Kohefiza, Bhopal 462001.
136. Mr Jai Nagda, C/O Veena Studio, Mahatma Gandhi Marg, Khandwa.
137. Dr Mihir Shah, Secretary, Samaj Pragati Sahayog, Garhi Bagli, Dewas 455227.
138. Mr R Gopalakrishnan, Secretary To C.M. & Coord., Rajiv Gandhi Missions, Government of Madhya Pradesh, Mantralaya, Vallabh Bhavan, Bhopal 462004.

Maharashtra

139. Mr A K Sinha, Deputy General Manager, National Bank for Agriculture and Rural Development, Samrudhi Building, MIDC Central Road, P O Box No 19421 Marol, Andheri (E), Mumbai 400093.
140. Mr Ajay A Dolke, Society for Rural and Urban Joint Activities, 18/7 Ujwal Nagar, Nagpur 440025.
141. Mr Anant Gogte, Managing Trustee, Gram Vardhini, 17, Vidya Vilas Colony, Aundh, ITI Road, Pune 411007.
142. Mr Annasaheb Hazare, Ralegan Sindhi, Ahmednagar.
143. Prof H M Desarda, Professor, CIDCO, No 2, Vithal Nagar, Aurangabad 431001.
144. Mr Kishore Waghmare, Reader Economics, Hislop College, Civil Lines, Nagpur.
145. Mr Manish Rajankar, Researcher, Vidarbha Nature and Human Science Centre, 509 Bhide Lane, Behind Nagpur Times Old Ramdaspath, Nagpur.
146. Mr Narendra B Patil, President, Sane Guruji Foundation for Education, Cultural and Rural Development Research, Nandadeep Chambers, Kacheri Road Amalner, Jalgaon Dist. 452401.
147. Mr Pradumna Sahasrabhojane, Vidarbha Nature and Human Science Centre, 509 Bhide Lane, Behind Nagpur Times old Ramdaspath, Nagpur.
148. Mr Prakash Gole, Director, Ecological Society, 1/B Abhimanashree Society, Pashan Road, Pune 411008.
149. Mr Ragnath S Mahajan, Project officer, Sane Guruji Foundation for Education, Cultural & Rural Development Research, Nandadeep Chambers, near New Court, Amalner, Jalgaon 425401.
150. Mr Rainer Horik, Journalist, 63 Rakshak Society, Aundh Camp, Pune 411027.
151. Ms Renu Gera, Project officer, UNICEF Water & Sanitation, United Nations Children's Fund, Ravindra Mansion, Dinchu Vakha Road, Mumbai.
152. Mr Sajan Jalan, Farm Manager, the Eria Barie Layout Tea Co Ltd, 5A Buty Layout, Rajnagar Chaoni, Nagpur.
153. Mr Shantanu Puranik, Geologist, Mining of Environment, Minevision System Pvt Ltd,

- 8, Kannamwar Nagar, Wardha Road, Nagpur 440025.
154. Ms Smita Gate, Deputy Director General, 3/5 Sharmishtha Apts, Senapati Bapat Road Shivaji Nagar, Pune 411016.
155. Mr Suryabhan S Khobragade, Secretary, Forest & Water Conservation, Krishak Charcha Mandal and Vidarbha Lok Vikas Manch, Village Saigata, PO Mendha, Chandrapur.
156. Mr Suryakant Kulkarni, Project Director, Socio-Economic Development Trust, Sidharth Apartment, Anand Nagar Sinhagad Road, Pune 411051.
157. Dr Upma Diwan, Executive Chairman, SIRD, V&PO Behiram Karanja, Taluka Chandpur, Amrawati.
158. Mr V D Mathur, General Manager, Irrigation, National Bank for Agriculture and Rural Development, 3rd Floor, Garment House, Dr A B Road Worli, Mumbai 400018.
159. Mr V Ranganathan, Addl Chief Secretary, Water Supply Sanitation, Government of Maharashtra, Mantralaya, Mumbai 400032.
160. Mr V S Subhash Deshpande, Secretary, Rural Development Division, Jnana Prabodhini, 510 Sadhiv Peth, Pune 411030.
161. Mr Vilasrao B Salunke, Managing Trustee, Gram Gurav Pratisthan, 113 St Patriks Town-Coop Society, Pune 411 013.
162. Mr Yogesh Pawshe, Lecturer, Agriculture, Samarth Science College, Ramtek 441106.
163. Mrs Yogini Dolke, Vidarbha Nature and Human Science Centre, 509 Bhide Lane, Behind Nagpur Times Old Ramdaspath, Nagpur.

Manipur

164. Mr Jelshyam Singh, Executive officer, WWAGS - Rural Development Services, Wangjing Bazar, Wangjing 795148.
165. Mr K Panmei, Secretary, Land & Water Management, Action for Welfare and Awakening In Rural Environment, Dindangiang, Thandweiband 795004.
166. Mr Y Surchandra Singh, Secretary Cum Director, Ecology and Environment, Rural Service Agency, Palace Compound (W), Imphal 795001.

Mizoram

167. Mr Dunglema, Former Secretary, Verdant Ridge, Aizwal 796012.

Orissa

168. Mr Gangadhar Pradhan, Chief Coordinator, Planning and Monitoring, Janmangal Mahila Samiti, Dimirisena PO, Puri 752011.
169. Mr Kallash C Dandapat, Executive Secretary, Rural Development, Jagruti, Narayani Road, Phuibani 762104.
170. Mr Prateep Kumar Nayak, Programme officer, Vasundhara, Pvt Plot No 29, Near Omfed Chhak Chandrasekharpur, Bhubaneswar 751016.
171. Mr Ranjan Kumar Samantaray, Engineer, Drinking Water and Sanitation, Janmangal Mahila Samiti, Dimirisena PO, Puri 752011.
172. Mr Ranjit K Pattanaik, Director, Planning and Research, Youth Association for Rural Reconstruction, P O Boinda, 759127.
173. Sibabrata Choudhury, Development Apprentice, Professional Assistance for Development Action, Sishu Bhawan Road, Keonjhar.

Punjab

174. Mr Sadhu Singh Gill, Farmer, Chakbilgan, Nawasahar.

Rajasthan

175. Mr A K Bhargava, Director & Consultant, Indian Institute for Rural Development, A-11 Malwer Udayan Bajaj Nagar, Jaipur.
176. Dr A K Sinha, Associate Professor, Environmental Geology Lab, University of Rajasthan, Jaipur 302004.
177. Mr Ajay Chandrakant Desai, Training Coordinator, CARE, Vidya Bhawan Krish Vigyan Kendra, Badgoan, Udaipur 313011.
178. Fr Cyril A Lobo, Director, Agriculture, R C Dcocesan Social Service Society, C/o R D Villa, Christian Colony, Madav, Ajmer 305024.
179. Mr Ganeshlal Gujar, President, Mewar Krishak Vikas Samiti, P O Lambodi, Via Charbhujia, Rajsamand 313333.
180. Mr Narender Kumar, Co-Director, CECOEDCON, Shilki Dungari, Chaksu 303901.
181. Mr Niranjana Sharma, Director, Social Action for Human Resource Development - Sohar, Village Anandpur, PO Mandhan Dist. Alwar, Alwar.
182. Mr Parag Choudhary, Asst Agricultural Engineer, Watershed Development and Soil Conservation Department, Agriculture Engineer, WD & SC, Deogarh, Rajsamand.
183. Mr Rajendra Singh, Secretary, Tarun Bharat Sangh, Bheekampura-Kishori, Via Thanagaxi, Alwar 301 022.
184. Dr Rampal Bisht, Agriculture & Desert Development officer, Bhoruka Charitable Trust, Bhorugram.
185. Mr Sudhir Sharma, Coordinator, Tarun Bharat Sangh, Bheekampura-Kishori, Via Thanagaxi, Alwar 301 022.
186. Mr Surendra Kumar Jain, 07 Hospital Road, Jaipur 302001.
187. Mr Surendra Kumar, Coordinator, Social Action for Human Resource Division, Village Anandpur, PO Mandhas, Alwar.
188. Dr T P Jain, Chairman, Medical, Indian Institute for Rural Development, A-11 Mahaveer Udyayan Park, Bajaj Nagar, Jaipur.
189. Mr Tej Razdan, Hony Secretary, Jheel Sanrakshan Samiti, 113 Chetak Marg, Udaipur 313001.
190. Dr Vikram Vyas, Executive Director, Ajit Foundation, 396 Vasundhara Colony, Tank Road, Jaipur 302018.

Tamil Nadu

191. Mr A Kalimuthu, Technical officer, WATERAID, South India office, 22-A Street, 1st Street New Colony, Mannarpuram, Tiruchirapalli 620020.
192. Prof A Vaidyanathan, Professor Emeritus, Madras Institute of Development Studies, P O Box 948, 79, Second Main Road Gandhi Nagar, Adayar, Madras 600020.
193. Dr B S Thandaveswara, Professor, Department of Civil Engineering, Indian Institute of Technology, Hydraulic and Water Resource Engineering, Madras 600036.
194. Mr G Vasudeo, In-Charge, Engineer, Vivekananda Kendra, Vivekanandapuram, Kanyakumari 629702.
195. Mr K R Gopinath, Promoter, Rain Water Harvesting, Precision Mechfab Pvt Ltd, AA-98 Anna Nagar, Chennai 600040.
196. Mr K Govindaraju, Director, Society for Education Village Action and Improvement, 133 Karur Main Road, Allur, Tiruchirapalli 620101
197. Mr Krishan Saigal, Trustee, Foundation for Sustainable Development, IIT, Chennai 600036.
198. Mr Lawrence Surendra, G-B Block 1, Triveni Appartments Kuppam Beach Road, Thiruvanmiyur, Chennai 600041.
199. Mr N Karuppuswamy, Project Executive, Tank Rehabilitation Programme, DHAN Foundation, 18 Pillayar Kovil Street, S S Colony, Madurai 625010.
200. Prof N V Pundarikanthan, Centre for Water Resources, Anna University, Chennai 600025.
201. Dr Kuppannan Palanisami, Professor, Water Technology Centre Agricultural University, Coimbatore 641003.

202. Mr. R Jeykumar, Managing Director, Rajparis Civil Constructions Ltd, 162-B, Greaves Land, Madras 600006.
203. Prof R Rajagopalan, Centre Director, International Ocean Institute Operational Centre, ICSR Building 1st Floor, Indian Institute of Technology, Chennai 600036.
204. Dr R K Sivanappan, 14, Bharathi Park, 4th Cross Road, Coimbatore 641 043.
205. Mr R Sreenivasan, Program Leader, DHAN Foundation, 18 Pillayar Kovil Street, S S Colony, Madurai 625010.
206. Mr S P Ganesh, Director, Centre for Rural Energy and Appropriate Technology Extension, Sannathi Street, Sikkal, Nagapatinam 611108.
207. Mr S Ramakrishnan, Senior Hydrologist, Chennai Metro Water Politan Water Supply & Sewerage Board, 1 Pumping Station Road, Chennai 600002.
208. Ms Santha Sheela Nair, IAS, Commissioner, Civil Supplies Consumer Protection Department, Chepauk, Chennai 600005.
209. Dr Sekhar Raghavan, D-15 Bayview Apartments, Kalajshetra Colony Besant Nagar, Chennai 600090.
210. Ms Sheela Suryanarayanan, Mapping Personnel, Farming and Rural Conservation Agency, C/O Mr V S Saravanan, 193, 7th Street Mallaishwari Nagar, Chennai 600073.
211. Mr T K Ramkumar, Chief Advisor, Exnora International, 42 Pelathope, Mylapore, Chennai 600004.

Uttar Pradesh

212. Mr Amit Mehrotra, Assistant Manager, Catholic Relief Services, A-1010 Indira Nagar, Lucknow.
213. Mr C Bal Krishna, Founder, Bharat Vikas Vikalpa, C-40 Sector 27, Noida.
214. Mr Ganesh Prasad Kala, Chairman of Sansthan, Himalayan Paryavaran and Gramya Vikas Sansthan, Village Sumadhi, Via Srinagar, Garhwal.
215. Mr J S Sarma, Director, Soil and Water Conservation, CSWCRTI, Dehradun.
216. Dr K H V Durga Rao, Scientist, Water Resource Division, Indian Institute of Remote Sensing, 4 Kalidas Road, Dehradun 248001.
217. Dr Krishna Gandhi, Secretary, Lokodyam Sanstha, 78, Mission Compound, Opposite Pwd Godown, Jhansi 284003.
218. Mr N P Pandey, Jr Engineer, U P Jal Nigam, Rabartsganj, Sonebhadra.
219. Dr P C Sharma, Head, Material Science Division, Structural Engineering Research Centre, Kamla Nehru Nagar, Post Box 10, Ghaziabad 201001.
220. Mr P N Shukla, Principal, Chakriya Vikas Vidyut Vidyalyaya, NTPC/NCPS Vidyut Nagar, Ghaziabad.
221. Ms Reetu Sogani, Research Associate, Sahayog, Prem Kuti, Pokhar Khali, Almora 263601.
222. Ms Ritu Batra, Student, School of Planning & Architecture, 451, Sector 37, Noida.
223. S R Mendiratta, Project officer, Water and Sanitation, United Nations Children's Fund, 14-B Mall Avenue, Lucknow.

West Bengal

224. Mr Chandreyee Banerjee, Associate Manager, Agriculture, Rural Development, Catholic Relief Services, 4/2 Orient Row, Calcutta.
225. Mr Dinabandhu Karmakar, Programme Director, Professional Assistance for Development Action - PRADHAN, PRADHAN Resource Management Team, L M Trivedi Lane Nikuthidanga, Purulia 723101.
226. Mr Uday Shankar, Assitant Manager, TRIFED, Ministry of Welfare, A-4 Chatterjee International Centre 13th Floor, 33a, Jawahar Lal Nehru Road, Calcutta 700071.

INTERNATIONAL

Bangladesh

227. Mr Mir Mohammad Almasum, Local Government Engineering Department (LGED), C/o Chief Engineer, LGED Bhaban, Level 5 Agargaon, Sher-E-Bangla Nagar, Dhaka 1207.
228. Ms Reba Paul, Environmental Engineer, Local Government Engineering Department, LGED Bhaban, Agargaon, Sher-E-Bangla Nagar, Dhaka 1207.

France

229. Mr Dangeard Alain, Water Club for Cooperation With India, 15 Rue Spontini, Paris.
230. Prof Gregory Berglund, Professor, Sciences Economiques, Ecologiques, Centre Franco — Americain De Management, Lyon.
231. Mr Marie-Lokraine Dangeard, Executive, Water Club for Cooperation With India, 51 Rue Spontini, Paris.

Germany

232. Ms Hannah Buttner, Lecturer, Department of Geography, University of Heidelberg, IM Neuenheimer Feld 330, Heidelberg 69120.

Japan

233. Mr Makoto Fujita, Associate Programme officer, United Nations Environment Programme, 2-110 Ryokuchi Koen, Tsurumi-Ku, Osaka 538-0036.

Kenya

234. Mr John Mbugua Kiongo, Sr Consultant, Water Engineer, Po Box 13047, Nakuru.

Nepal

235. Mr Ajaya Dixit, Editor & Coordinator, Water Resources Engineering, Nepal Water Conservation Foundation, Post Box No.2221, Baluwatar, Kathmandu.
236. Mr Dipak Gyawali, PRAGYA (Academician), Royal Nepal Academy of Science and Technology, Nepal Water Conservation Foundation, Post Box No.2221, Baluwatar, Kathmandu.
237. Mr Dwarika Nath Dhungel, Coordinator, Development Unit, International Union for Conservation of Nature, Gpo Box 3923, Jawalakhel, Kathmandu.
238. Mr Madhukar Upadhyaya, Research Collaborator, Watershed Management, Water Conservation Foundation, Gpo 221, Kathmandu.
239. Mr Nagendra Raj Panday, Modern Pokhara, VDC, Palpa.
240. Mr Prasad Ghimire, Madanpokhara, Village Development Committee Ward No 5 Lumbini Zone, Palpa.

Singapore

241. Mr Adhityan Appan, President, International Rainwater Catchment System Association, Nanyang Avenue, 639798.

Sri Lanka

242. Ms Padma D Jayaweera, Additional Secretary, Sri Lanka Administrative Service, Ministry of Provincial Councils & Local Government, No 330 Union Place, Colombo 2.