

## Water Conservation and Public Awareness -Perspective and Programmes

By

K. K. S. Bhatia and Manohar Arora

Ganga Plains Regional Centre  
National Institute of Hydrology, Patna

**Abstract :** *Water has a fundamental and pervasive influence in human ecology however an adequate perception of water issues and appropriate responses to water problems will not occur in national socio-economic planning without deliberate communication efforts on the part of water authorities. The problem relating to water and its use, management and optimal utilisation are all the more important in developing countries like India because of exponential growth of population, poverty among masses, lack of education, lack of will to adapt new technology, social taboos, language barriers, cultural imbalance and lack of proper communication network etc. Water conservation is now realised as a basic need for proper water management and there is always a need to have better and appropriate means of communication to have public participation and involvement.*

*The present paper has been devoted to the above mentioned ideas and specifically an attempt has been made to discuss water conservation, various techniques of water conservation, different techniques of communication and public participation etc. The paper opens with an introduction giving critical role of water, India's water availability, need for water conservation and public awareness. After this preamble a brief portion is devoted to various practical techniques of water conservation including water conservation in industries, houses etc. The next part focuses on role of administrators in water conservation, participation processes, magnitude of participation etc. The various techniques of public participation have been discussed in details specifically concentrating on suitable techniques for developing countries. The paper has been concluded by highlighting the need for water conservation, role and participation of public, role of water administrators in such programmes and appropriate inferences have been drawn for developing countries. As the literature available on public participation and various techniques of such participation is not readily available in India the paper ends with an exhaustive bibliography on the subject.*

### 1.0 Introduction

Water is the most essential natural resource for life next to air. It is an integral part of man's environment and the extent to which it is abundant or scarce, clean or polluted, beneficial

or destructive, determines to a very large degree the quality of his life. Due to its multiple benefits and the problems created by its excesses shortages and quality deterioration, the water has a unique role as a resource. The relentless increase in the demand of water for various

purposes brought about by population growth, and agricultural and economic development combines with poor efficiency in water use and increasing pollution of water supplies have raised serious problems. Available water must, therefore, be optimally developed and used almost beneficially under appropriate priorities of use consistent with requirements of the region,

India with its geographical area of 3.27 million sq. km. has average annual precipitation of the order of 4000 cubic kilometer including snow-fall for which full details are not available. Out of this, the seasonal rainfall confined to 3-4 months in a year is of the order of 3000 cubic km. Its distribution over the country is highly skew, viz, 100 mm in West Rajasthan to over 11000 mm at Cherapunji in Meghalaya. The annual variation of rainfall is also highly uneven. The areas receiving less rainfall has a very high coefficient of variation. The average annual natural flow available in India, which is about 1880 cubic km. Most of the flows of rivers in our country occur during the monsoon season and particularly as flood flows. Further the availability of water also varies from place to place and is not spread uniformly over the country, creating pockets of scarcity of floods. Hence, the utilisation of water resources is very much dependent on the extent of storages that can be created. Owing to the topographic, hydrological and other constraints, it is assessed that only about 1110 cubic km. out of 1880 cubic km. of water can be put to beneficial use. Out of this, the annual utilisation possible through ground water are about 420 cubic km. per year. Assessed surface water resources of India are around 1780 Bm which is about 3% of the world's surface water resources, whereas the country's population is about 16% of world population. Only 17.4% of surface water is being used while the rest flows down into the sea, often causing disastrous flooding and drainage congestion from the above paragraph it becomes evident that because of non-uniform

distribution of water in space and time, storages are very important. However, there is another dimension to this phenomena - alongwith storages we must have to conserve our water. Once we talk of conserving water the various involved are - policy makers, administrators, technocrats and people. The last item in this is the most critical/crucial, especially in a developing country, like India. Where the literacy is only 42.49% and people have to be educated from ab-intio.

The growth process, increase in population dependence of about one third of country's population on agriculture, low per capita income and the expansion of economic activities inevitably lead to increase in demands for water for diverse purposes such as domestic, municipal, agriculture, navigational, recreational industrial in general and power generation in particular. The use of water can be broadly classified into two categories (i) consumptive - use of water for irrigation is regarded as consumptive use, of water for irrigation is regarded as consumptive use, and (ii) Non-consumptive use of water for hydro-power, recreational use etc. are non consumptive. It is estimated that the demand for water use for these diverse purposes may be of the order of 1050 cubic km. by the year 2025 AD. There after the situation will be critical. The demands for water in various sectors including domestic use, irrigation, energy industry etc. during year 1990 and projections for year 2000 and 2025 are given below.

#### Projections of Water Demands of India

Water use in various sectors	Demand (Km <sup>3</sup> ) in the year		
	1990	2000	2025
Domestic	25	33	52
Irrigation	460	630	770
Energy	19	27	71
Industrial	15	30	120
Others uses	33	30	37
<b>Total</b>	<b>552</b>	<b>750</b>	<b>1050</b>
-Surface Water	362	500	750
-Ground Water	190	250	350

To ensure water availability wherever needed and to safe guard its quality under the pressure of rapidly growing population and economic expansion, will require systematic and scientific management of available water resources. In view of all these aspects, it is necessary to introduce water conservation strategies in various uses for better management of water.

Although water has a fundamental and pervasive influence in human ecology, an adequate perception of water issues and appropriate responses to water probleme will not occur in national socio-economic planning without deliberate communication efforts on the part of water authorities. However attainment of this objective is closely associated with development of public perceptions and attitudes as well as perceptions and attitudes of planners and decision makers in the water sector. This the development of 'Public awareness' and 'awareness' within the water sector plays key role specially in developing countries like India, which will provide a means whereby citizens can acquire the necessary education in use of water facilities developed as a result of the planning process.

## **2.0 WATER CONSERVATION AND VARIOUS METHODS FOR WATER CONSERVATION :**

'Water Conservation' means a more cautious or efficient use of available water supplies at a particular time at a particular place. The alarming rate of population growth has led to increasing pressures on the basic life support systems of land, water, flora, fauna and atmosphere. The demand of water as is expected by year 2025 to increase by 100% of the present level of demand. Besides increase in water demand, there is large variability in water availability from region to region, season to season and year to year. Frequent droughts in many parts of the country indicates need for conservation of water. Strategies of water

conservation will reduce the intensity of drought & water scarcity. By introducing intensive water conservation, we may be able to revitalise our perennial rivers which dry up during the summer season.

### **2.1 Conventional Measures**

Among the conventional measures adopted for water conservation are surface storages and Ground water exploitation.

#### **2.1.1 Surface storages**

Storage of water by construction of various water resources projects has been one of the oldest measures of water conservation. The scope of storage varies from region to region depending upon water availability, topographic conditions etc. Besides, cost of construction has gone fairly high. The environmental impacts of such storages need also to be examined for developing an environmentally balanced strategy.

#### **2.1.2 Ground water exploitation**

The ground water levels in many areas are going down, especially where the ground water is used for irrigation and other purposes. With the fast development of ground water exploitation; unless there is regular recharge of these resources; even they will get depleted very soon. Already in many countries this bitter experience is looming large. But no one is thinking of the simple systems which can easily recharge them.

### **2.2 Rainwater Harvesting :**

#### **2.2.1 Surface water conservation**

Rainwater harvesting techniques have been used for agrtculture in several parts of the world since ancient times. The infrequent rain, if harvested over a large area, can yield considerable amount of water. Contour terraces are widely used for this purpose. This is done by placing long rows of stones spaced at intervals along the contour of a slope.

## **2.2.Y Collection and storage of rainwater from roofs**

In humid or sub-humid regions where rainfall of considerable intensity is spread over the large part of the year, roofs made up tiles or corrugated galvanised iron are used to harvest rainwater. The runoff from roof tops is collected in different kinds of storage tanks which can be above or below ground.

## **2.2.3 Rainwater collection from ground catchments,**

For areas with less rainfall and of short duration it is worth attempting, the techniques which will induce surface runoff which can be stored for use. Some of the techniques of runoff inducement are

a) Surface clearing : This is the oldest method for runoff inducement. All the runoff can be utilised after land clearing.

b) Vegetation Management : Vegetation management can alter the water budget of watershed by modifying the hydrologic processes involved. This includes conversion of areas immediately adjacent to stream channels to runoff-enhancing vegetation covers, clearing the forest or shrub cover in uniform or irregular strip cuts and thinning overstorey densities.

c) Chemical Treatment : The permeability of the soil can be reduced by dispersing the clay fraction with the use of chemicals thereby increasing surface runoff.

d) Surface Binding Treatment : Petroleum products, which penetrate the soil surface, bind soil particles together and provide an impermeable surface, have been used in many situations for surface sealing. Application of these materials binds the soil particles together and provide an impermeable surface, have been used in many situations for surface sealing. Application of these materials binds the soil particles together and provide an impermeable layer at the surface, which results in higher surface runoff.

e) Rigid Surface Covering : Water supply can be increased by increasing. Rigid catchment covering includes use of corrugated aluminum sheets, timber framework and also runoff harvesting from highway catchments,

f) Flexible surface covering : Flexible surface covering with prefabricated products have made it possible to make an area quickly water proof.

## **2.2.4 Groud water conservation**

Groundwater has major benefits as emergency supplies in water scarce areas. In order to maintain the groundwater resource indefinitely, a hydrologic equilibrium must exist between all water entering and leaving the basin. In order to maintain equilibrium the following techniques can be adopted.

### **2.2.4.1 Artificial recharge**

In water scarce areas, due to low and erratic distribution of rainfall and the consequent increased dependence on groundwater, due to the denudation of vegetation, the natural water absorption capacity of the soil is already upset. Now a days with the uncontrolled deforestation and other human interference, the soil is not able to absorb water at the previous rates. That is why now there is much heavy runoff during rains. This results in lowering of water table. As the main source of groundwater recharge is rainfall, in its absence or excess runoff, the only alternative way to replenish the ground water is by artificial recharge. The most common technique used to recharge groundwater artificially is done by water spreading over the ground surface to increase area and length of time for water to remain in contact with soil to allow the maximum possible quantity of water to enter into the soil mass. The artificial recharge by recharge wells has also proved effective. This depends on the site condition and physical characteristics of soil profile. The following factors involves consideration for selection of recharging site :

- Availability of land and topography
- Hydrological condition.
- Possible sources of water for recharge
- Operation and maintenance problems.
- Economics Conditions.

#### 2.2.4.2 Percolation tanks

Groundwater can be recharged artificially by constructing percolation tanks across the water courses. Percolation ponds in steep slopes may be very useful in improving the ground water table and recharge potential of wells. Studies carried out in central Maharashtra, showed that the average area of influence of a percolation tank was 1.5 sq. km., the average groundwater level rise was 2.5 m and the annual artificial recharge to groundwater from each tank was 15 ha.m.

#### 2.2.4.3 Sub-surface dam

Two-Third of the Indian sub - continent have hard crystalline rock formation and its groundwater storing and transmitting capacity primarily depends on the fractures and joints of the rocks. Ground water sanctuary in hard rock areas can be developed by impounding the flow of water by constructing dyke across the flow direction of groundwater, Sub-surface dykes of 1 to 4 metres height were found effective in augmenting the ground water resources, particularly in hard rock areas underlain by fractured aquifers. Water from storage structures causes reduction in storage meant. Some of the approaches/techniques used to reduce evaporation from water bodies are ;

- \* Locating reservoirs at high altitudes
- \* Keeping the lower area/volume ratio of water body
- \* Minimising exposed surface through reservoir regulation.
- \* Constructing artificial aquifers
- \* Application of monomolecular film,
- \* Reducing energy available for evaporation .
- \* Installing wind breaks.

## 2.3 Reducing Demand of Water

Out of the total 552 cubic km of water available nearly 460 cubic km is being used for agricultural purpose and 15 cubic km for industrial uses and remaining other use. The demands pertaining to irrigation and industries can be reduced by changes in crops and cropping practices in agriculture and by changes in technology or product in industry respectively.

### 2.3.1 Reducing evapotranspiration

Evaporation from soil surface in water scarce areas, where in general low humidity conditions prevail and transpiration by plants together accounts for evapotranspiration losses. Evaporation losses can be prevented by placing water-tight moisture barriers or water retardant mulches on the soil surface. Transpiration losses of plants can be reduced by (i) reducing air movement over a crop by wind breaks, (ii) evolving varieties that transpire less, (iii) destroying unwanted plants or unproductive leaves, (iv) enclosing the crops with a structure so that transpired water can be collected and reused and (v) using chemicals.

### 2.3.2 Adjusting cropping pattern

The crop selection pattern should be based on their efficiency in utilizing water. Some of the plants suitable for water scarce areas are (i) plants having shorter growth period (ii) high yielding plants that require no increase in water supply. (iii) Plants that can tolerate saline irrigation water. (iv) plants with deep and well branched roots.

### 2.3.3 Improving irrigation practices and irrigation scheduling

In water scarce areas the usual surface irrigation methods are of little use because of high losses of water due to evaporation and percolation. Some of the suitable methods of irrigation, sub surface irrigation, use of gated pipes for irrigation can save seepage loss of water in field laterals. It is essential to schedule

the irrigation properly and give due consideration to growth stage of crops in determining water requirements of crops. The scheduling of irrigation requires knowledge of soils, crops, climate, water supplies, irrigation system facilities, system layout, soil and economic factors and other constraints of the system. Several techniques have been developed for scheduling irrigation based on a number of criteria like plant water status, soil water status, stress index etc. The technique using soil water status is perhaps most convenient and can be implemented easily as compared to other criteria. Therefore, there can be following two approaches which can be used for irrigation scheduling:

- i) taking a constant fraction, let us say 50% of depletion level for irrigation scheduling.
- ii) taking variable fraction during growth stages as per following description (for example) Initial stages 60%, vegetative stage 50%, fruiting and flowering stage 40%, harvesting stage 70%.

The scheduling of irrigation should also take into account the availability of water for applying irrigation. The scheduling procedure can be modified in view of the actual soil moisture depletion at the time of water release to the field. There may be some time lag between the actual time when crops need irrigation and the time when the water is available for irrigation. Provision should be made to incorporate this aspect in the irrigation system.

## 2.4 Reuse of Water

Reuse of waste water can be done for irrigation industry, recharging groundwater and even for municipal use with proper treatment. Municipal waste water can be used for irrigation of agricultural land close to cities and also for industrial use. Municipal waste water can also be used for industrial purposes after treatment. In any reuse scheme, major constituents of waste water like pathogenic bacteria and viruses

parasite eggs salts and nitrates have to be completely removed.

## 2.5 Interbasin and within Basin Water Transfer

In India the number of major and medium river basins are 12 and 46 respectively and these contribute over 90% of the total runoff. The Ganga-Brahmaputra-Meghna basin is the largest in India. The northern and eastern regions are drained by the Ganga and the Brahmaputra river system having substantial water resources whereas the western and peninsular regions of the country have comparatively low water resources. Because of this uneven distribution of water resources the schemes for diverting waters from regions with surplus water to water deficit regions can be thought of. These transfers have to be properly planned keeping in mind interest of water users in both the receiving and supplying basins.

## 2.6 Weather Forecasting

Weather forecasting is being paid due attention with particular reference to monsoon rains because of frequent occurrence of drought in the country. In recent years successful forecasts have been made by the department of Science and Technology in respect of monsoon rains. Use in long term weather records and correlation between changes in certain physical features like sea surface temperature with the ensuing weather conditions are being used to forecast weather condition.

## 7.2 Water Conservation in Industries

A sound water budgeting in industry can reduce the water demand to a considerable extent. Water conservation measures in industry should include :

- (i) review of the alternative production process and technologies from water consumption point of view.

- ( ii ) ensuring sound plant maintenance practices and good house keeping, minimising spills and leaks and.
- ( iii ) Optimisation of treatment to achieve maximum recycling.

The adoption of modern manufacturing technologies which inherently require less water than older technologies it is to be properly planned. The dry cooling tower techniques is one of the water saving methods that can be attempted.

### 3.0 PUBLIC AWARENESS

In order to have an adequate perception of water issues and appropriate responses to water problems, deliberate communication efforts are necessary. In motivating conscious recognition and consideration of water issues, public perceptions and attitude of planners and decision makers in the water sector for increasing "Awareness" is therefore defined as a developed level of perception and knowledge relating to the substance and significance of water issues, and associated development of attitude and motivation towards appropriate action. In relation to achieving awareness among planners and decision makers dealing with national socio-economic planning, two communication goals must be satisfied namely.

Perception and knowledge of important water issues relevant to national socio-economic planning must be communicated to planners and decision makers and.

— attitude and motivation of planners and decision makers must be developed so that they wish to see effective resolution of water issues and become committed to working for solution.

Open planning processes and public participation are important means for communicating awareness. These processes are among the most effective mechanisms by which individual nations can develop and heighten internal

awareness of the specific water related issues that are important to their own socioeconomic planning. Hence, action to promote the effective application of open planning and public participation is a potentially powerful means of attempting to heighten awareness of water related issues with national planning activities.

The form and degree of public participation in planning and policy making potentially covers a continuous spectrum of alternative levels of activity and power sharing.

Near one end of this spectrum are wholly paternalistic approaches where a technical or political elite, working in closed processes, formulates plans and policies which are not made public until the decisions have been made. Near the other end of the spectrum are participatory processes in which the public participates directly in planning and policy making throughout the entire process and may be given some degree of control over the process itself. Between the extremes are a range of processes where varying amounts of information are released and public inputs sought at progressive planning stages and where the degree of consultations and citizen control in decision processes may range from being a minor to a dominant factor. The varying nature and dimension of planning problems and the interests of practical efficiency show that widely different positions in the spectrum of participation will be appropriate for different planning studies. The public for its own part, will also have differing expectations of involvement for differing levels and types of planning problems.

The range of processes contributing to public awareness is the band of open planning processes where information is deliberately made accessible or transmitted to the public but is not actively solicited, and the band of participative processes which are not only open in the sense of publicly reporting inform-

ation throughout the exercise but which actively seek degree of public participation in the investigation, planning and decision processes.

By open planning processes the public awareness and the awareness of the other planners and decision makers can be increased through the public release of information. **whereas** closed planning procedures and open but firmly non-participative processes tend to create an elite group of technologists and administrators who have difficulty in perceiving issues outside their own bounds of experience and technical expertise. The gap between open planning and participative planning is not necessarily wide one.

The basic demand for increased public participation is related to the growing complexity of decisions and their social interactions, largely as a result of rising population pressures and impacts of rising development on natural resources in both developed and developing countries. In developed countries, environmental issues have been particularly significant in promoting a trend of increased citizen interest and desire to influence decision making. Many issues involved in public participation are those of affluent industrial communities. On the other hand in developing countries, issues addressed in public participation are more likely to relate to basic human needs, and generally less government sponsored or spontaneous citizen action occurs. In such countries open planning and public participation will provide a means whereby citizens can acquire the necessary education in use of water facilities development as a result of the planning process

#### 4.0 MAGNITUDE OF PARTICIPATION

The use of public participation normally demands a significant commitment of staff and effort. Once started, however, a participative exercise cannot easily be terminated without serious loss of credibility. Hence before a participation exercise is started it should be understood and not initiated if it cannot be

justified or satisfactorily completed. The following are some of the circumstances given below where the benefits may be insufficient to justify public involvement :

the problem and general approach are well defined by accepted precedent ;

— initial comprehensive approaches to the public reveal little interest or concern and no purposeful objective of participation can be identified for the public or for the planning authority ;

— the values associated with project provoke little or no community conflict ;

— the early release of information may cause a sector of the community to move to block the interests of another.

But before public participation the water authority should be sure and consistent in its own view of the objectives of the exercise and must carefully, consistently and repeatedly communicate :

— the objectives of the participation programme.

— the procedures being followed and deadlines in those procedures.

— what is expected and allowed of contributors;

— what use the authority intends to make of information acquired ; and

— the limits which bound the possible responses of the authority itself.

#### 5.0 PUBLIC PARTICIPATION AND COMMUNICATION TECHNIQUES

Choice of techniques is one facet of public participation which varies markedly between nations according to cultural and political characteristics and state of economic development. The techniques of public participation primarily depend upon communication techniques. Communication established for promoting awareness may involve one way communication (transmission) and/or two way communication (transmission/reception). The art of



good communication lies in good selection and use of the media and appropriately combining and diversifying the media used to gain greater penetration, range, detail, reinforcement and persistence of the transmitted message some of the most commonly used communication media or potentially available used communication media or potentially available used communication media or potentially available for developed/developing countries are discussed below.

## 5.1 Visual Media

The visual media can be broadly classified into two categories, one is graphics and other typographic.

### 5.1.1. Graphics

(a) Poster graphics with sparing use of text as medium :

In this information is summarised to basic elements. Its function is self sufficient exhibit, or backdrop to other communications. The cost of production is low and gain interest of moderately large audience. This can be used as aid for people who are being used as re-transmitters. It is helpful in developing countries. On the other side it is one way communication only and conveys only basic information because of the short time contact with the receiver.

(b) Exhibitions ; Manned by persons : This can be done by persons with knowledge and ability to amplify and discuss with interested spectators. its function is to communicate in situations where an exhibit can attract viewers stimulate discuss and promote communication. This is two way system of communication useful as a publicity medium Such exhibits attract viewers and achieve one to one communication, Travelling displays also help in improving contact with viewers. It's drawback is that it is expensive and commonly bulky to transport.

(c) Slides and slide kits : Photographic slides may be produced for supply in kits and

supported by information booklets. It can be used mostly as aids in support of talk or lecture or as a component of an exhibit can be used as a per requirement by changing selection and sequence, cost of production is less and it is very portable. This is limitations because of requirement for a projector, screen and semi-darkened viewing area. Also it is one way communication only.

### 5.1.2 Typographic

(a) Brief written materials : Brief written materials in the form of Pamphlets and illustrated booklets for a specific purpose in which text information, ideally supported by good graphic is used to provide general information in concise, appealing, easily understood and referable presentation. This can be used for wide distribution at a low cost though large wastage is expected with mass distribution, presentation can be simplified for easy consumption and the publication may be retained by the receiver for future reference. Brevity may cause loss of important information.

(b) Reports and books : provision of substantial information which may be complex in nature can be provided in written documents with relatively complete coverage of a subject. It is the most common and accepted way of presenting information in a form in which it can be studied and evaluated but unless these are well written, well presented and well promoted reports will not command wide readership.

(c) Journals and periodicals : Journals and periodicals can be published from the technical or popular press with established readership. These media will reach an audience with a higher than average level of interest if the readership of the journal is on appropriate group though this way of communication is with little feedback and audience is restricted readership. The receiver may retain his copy for future reference.

(d) Articles or Reports in daily or Weekly Newspapers : Through this medium newswork-

thly information or advertisements can be communicated to a very wide potential readership. It is rapid form of communication newsworthy, also journalists may not take time to adequately research background for their article.

(e) Mailed Circulars : This is a form of communication to individuals by public mail or by private deliveries and can achieve wide distribution. It is possible that mass mailings may have a high rejection rate unless message is extremely simple/or well presented.

## 5.2 Oral Communications

Oral Communication can be thought of using radio broadcast or audio tapes though this has to face lot of competition as it is no more a popular medium. Somehow it is still influential in developing countries than developed countries.

(a) Radio broadcast : Communication of public interest, documentary, or news information can be suitably performed through radio broadcast. This is a flexible medium able to transmit talks discussions or interviews. Low cost and high portable personal receivers still make it useful.

(b) Audio Tapes : This medium is widely used for distribution of prepared talks, lectures or dramatized material to interested listeners or for use as a teaching aid. It is not a popular medium.

## 5.3 Oral and Visual Combinations :

(a) Communication to an audience : Talks and discussions can be held for addressing a group with arrangements for formal and informal discussion and questions. The advantage in it is to get an opportunity for feedback but it is restricted with groups within range of travel and with time to attend.

(b) Motion Picture : Movie film as a medium can be used for documentary of educational film sequences. This involves large audiences and is useful particularly if movement

is important to the images presented. It has few limitations as requirement of professional scripting and production, costly, time consuming to produce and to duplicate.

(c) Videotapes : it is similar to motion picture with an additional advantage that it can be replayed through domestic television units.

(d) Television : This the highly popular mass medium transmitting into receivers homes. Public interest, documentary, or news information can be communicated widely through this medium. In the some developing countries opportunities of use may be very limited where ownership of receivers may be very limited.

(e) Tapes and Text : Audio tape supported by or supportive of a written text can be used mainly as a teaching aid. It is cheaply reproducible and compact. Can be produced with relatively simple skills but tends to be limited to use as formal teaching aid.

## 5.4 Computer System

Computer terminals as components of exhibits generally attract interest. A range of functions are becoming possible including information retrieval, demonstration games and simulations, dynamic graphics and microprocessor controlled operations. Response of Computer system can be at varied levels relating to the level of the inquiry. The disadvantages are that these have very limited portability and access to suitable machine may be limited. Also professional skills are required for planning and implementation.

## 6.0 PUBLIC PARTICIPATION TECHNIQUES

As described above the various techniques used as communication media for transmission purposes there are techniques of public participation which varies markedly between nations according to cultural and political characteristics and state of economic development, some of these techniques are as follows:

## 6.1 Large Group Meetings

Public hearing and meeting : These are formal public proceeding usually required by statute and Informal public proceeding providing an opportunity for Public to ask questions and to voice opinions. The disadvantage lies in the fact that these does not usually allow for two way communication or continuity of interactions.

## 6.2 Small Group Meetings

(a) Lectures and Discussions : The purpose of this technique is to identify community concerns to inform citizens of the plans, issues, pollution control techniques water quality agencies etc, This provides opportunity for informing the public and exchanging information but lack of good two way communication may lead to citizen apathy.

(b) Site visits : Field trips to sites of existing or potential impacts can sensitise planners and citizens to project impacts. It reduces the need for community meetings and assist in gaining support for a plan if they are fully involved in planning. The role of body is often mistakenly seen by the public as a decision making body and by agencies as a threat.

(c) Advisory body : Representative citizen group can be appointed to sensitise planners and citizens to project impacts. It is a two way communication process reducing the need for community meetings and assists in gaining support for a plan if they are fully involved in planning. Sometime the role of body is mistakenly seen by the public and by agencies as a threat.

(d) workshops : To identify and to recommend solutions to problems working sessions are held in which interested affected public and government representatives discuss specific issues. This means is a good learning experience for both the public and government repres-

entatives. It is two way communication but requires careful preparation and well trained leaders to be effective.

## 6.3 Institutional Arrangements

(a) Public agency offices : Public agency offices located close to projected areas provide better contact between agency and local citizenry. such offices gives an opportunity for agency personnel to become more sensitive to local issues. There may be some loss of central control.

(b) Citizen representative bodies : To provide community interest groups with greater involvement in decision making process citizen representative body can be constituted. This permits citizen to participate in decision making encourages citizens to be committed to support project implementation. Such body must be forceful and articulate.

(c) Public interest centre : An office which disseminates information and provides speakers for community meetings to serve the community as a source of information on environmental issues, citizen rights and technical information written so the general public can understand it. Such centre assists citizen in improving two way communication with government. The disadvantage of the type of centre is that it may be ignored by government which may see the centre as a threat to authority of merely as a public relation office.

## 6.4 Media

(a) Brief written materials : Brief written material in the form of pamphlets, brochures and summary reports serves as better means to provide the public with general information and easily understood documents. These materials can reach a large number of people at a low cost but is only one way communication with little feedback and brevity may omit key information from being transmitted.

(b) **Movie film and slides :** Movie films and slides showing water issues and solutions are helpful in creating awareness of water problems, and methods of dealing with them. when used with local issues and opinion leaders can be an effective technique. This technique can be expensive.

(c) **Tape recorded information :** to inform citizens and obtain their opinions on issues quickly tape cassettes can be sent to citizen groups with discussion topics. Citizen responses are recorded and returned. This is a two way communication though is expensive and requires time and space,

(d) **Radio and talk show :** This technique involves program which provides experts a forum to respond to telephoned question from citizens. The advantage lies in the fact that citizens can have direct two-way communication with decision makers and a wide audience can be reached but agency administrators may be unwilling to commit time. They may also not like the public scrutiny. This type to technique is possible only in developed countries where the rate of literacy is high.

(e) **Press release and articles in Newspapers :** This technique can be adopted to inform people of issues rapidly announce meeting dates, changes in technology and changes in law. This provides a forum for local issues and continuous communication. Such techniques also involve hectic updating of mailing lists and editorial subjectivity can distort issues and destroy credibility.

## 6.5 Community Interaction

(a) **Official responses :** to maintain good communications with public and to respond to questions official response through letter, telephone etc can provide honest and precise responses to concerns of citizens. The limitations of such technique is that it requires open and knowledgeable persons in agencies to respond competently.

**Formal attitude survey :** To determine the values and position of a representative sample

of a community can be fulfilled by formal attitude survey. It provides an objective view of popular values and preferences that are representative of the community although it is expensive and requires experts to conduct accurately.

## 70 CONCLUSIONS

In recent years water has gained the status of prime mover for the development and survival of man kind in India. The changing of the name of the Ministry of Irrigation to Ministry of Water Resources was the first bold step which was taken in this direction and after adopting this name water is being looked at as a resource and has become an element necessary for survival. If one looks at the progress in the development of water resources after independence, a remarkable growth is visible, However the total amount of rainfall in the country is almost unchanged and is around 115 cms. Now if one looks at the demand, it is clearly apparent that is mainly depends on the population. Whether it is domestic requirement or irrigation requirement or any other demand it will increase with population. In India though in recent years effective measures have been taken to control population however still remains lot to be done. Hence to feed millions of human beings the main item which is directly or indirectly required is WATER, Now either one should increase its availability or one has to learn to live with less or optimise ones use of water. Here comes the importance of water conservation. By this it is not intended to say that one should stop looking at increasing the water availability but to say that along with this water conservation shall be taken in right earnest. Water conservation is an operational idea which can be successful if and only if there is an awakening masses and people are made to participate in these programmes by creating an awareness in them by adopting proper communication techniques and by using appropriate public participation techniques. For this, there could be two directions in which the water admini-

stration can work firstly by volunteer approach and secondly by implementation of legal laws, The first approach will be suitable for countries which have reached a stage where people are educated and can understand the implication of adopting or not adopting such conservation measures and the second approach will be suitable for masses which have not reached such level of consciousness. In a country like India where we are at a stage of development a judicious mix of the two approaches will be ideal.

The difference between the objectives and elements of programmes which are appropriate for developing countries and those which are appropriate for developed countries will be of fundamental importance in establishment of awareness programmes. No awareness programme should proceed without a clear perception of its objectives. In developed countries the water related awareness is more likely to be for improving awareness of specific key water issues rather than for establishing general awareness of the importance of considering water in socioeconomic planning. Comprehensive planning will be more commonly accepted than in developing countries and the problems relating to awareness of water will be associated particularly with the difficulties of being heard amidst the other issues.

In developing countries the needs for awareness are likely to be more fundamental. These countries have greater immediacy in planning problems which commonly relate to basic concerns for attaining, rather than for maintaining, a desirable quality of life. In developing countries it is a question of survival where as in developed countries it is a question of achieving higher standards of living. The potential improvements in socio-economic decision making through increasing inter-sectorial communication and awareness are likely to be greater for developing countries than for developed countries. In such countries the expertise and outlook of water authorities

may be focused in a relatively narrow functional role and the skill, breadth of experience, and awareness for initiating and leading such programmes may be limited.

The prime objective of awareness programmes stresses need for political will. The first and most obvious point for stimulating awareness is through planning processes of the water authorities. Awareness programmes which run independently of the national water planning process are likely to find difficulty in obtaining appropriate stimulation and in maintaining momentum and relevance. Whatever the level of a particular nation's economic development, the inter-relationships between water planning and socio-economic planning are sufficiently important and complex so that there is likely to be an ongoing need for development in the application of comprehensive planning techniques and in the use of communication skills.

When water authority skills are not sufficient to achievement of desirable levels of awareness of water issues, actions by other national bodies such as universities or professional associations may be needed. These bodies can assist the communication process by encouraging and assisting debate and by education and training programmes. The role of non governmental organisations is very important and critical as such organisations are supposed to be free from governmental bureaucracy and hierarchy. They also have full participation and indulgence of academicians and professionals. The professional training for the water sector is technologically based and apart from skills developed through experience in the workplace, water authority professionals will have had very little opportunity or of comprehensive water planning. Educators and professional association can promote such skill development in under-graduate, post graduate, and refresher training programmes.

In India awareness on role of water should be so planned that water conservation must be taken by the Government as family planning

campaign was taken during 1960 and 1970. The media must give emphasis and proper techniques with a clear objective and goal should be adopted to reach the masses. Such means of communication and clarity of techniques should get proper feedback from literate as well as illiterate masses.

The primary responsibility and need for developing and communicating heightened awareness of water issues rest with water authorities and water planners. However, the importance of this responsibility may not always be clearly perceived by these groups only. Such authorities may therefore feel constrained and may need greater assurance that positive action in communication awareness is a valid activity and is at least an implicit part of their responsibilities. Water conservation is an issue which is related not only to water resources engineers and administrators but encompasses the gambit of a number of other departments like department of environment, agriculture, agriculture, rural development, etc. Hence a close interaction and cooperation is necessary at governmental level also. There may be situations when the expertise and outlook of water authorities may be focused in a relatively narrow functional role and the skill, breadth of experience and awareness for initiating and leading such programmes may be limited. In such circumstances the development of awareness may be more dependent on their agencies, who ideally should also apply part of their energies to encouraging development of such capacity and outlook within the water authorities. The role played by research organisations, educational institutions Government departments and schools also owe responsibility for heightening awareness of water, when we talk either of water conservation or awareness of issues the most critical aspect affecting this issue is people. In India where the literacy is very less and people have to be educated from ab-initio, the teaching and stress of water conservation at school level and in educational institutes with very clear

perception and simple techniques will be accepted by young receivers, which in turn will develop into good transmitters.

## BIBLIOGRAPHY

1. Arnstein. S.R. A ladder of citizen participation. *Journal of American Inst. Planners*, Vol. 35, 1969, PP 216-244.
2. Chandra, S., Recent trends in conservation of water for drought prone areas,' *Journal of Institution of Engineers (India)*, Vol. 66, Part CII, July, 1985.
3. Chandra, S. and Sikka, A.K., 'Water conservation in urban areas, *Proceedings of first Afro - Asian Conference, Bombay, October, 1988.*
4. Cooley, K. et al. (1975), 'Water Harvesting State of the Art, Watershed Management, Symposium of the ASCE, Irrigation & Drainage Division.
5. CWC, (1988), *Water resources of India*, CWC publication No 30/88, April, 1988.
6. CWC, (1991). Theme paper on water conservation. *Water resources day, April, 1991.*
7. Glasser, R., Manty, D. & Nehman, G. Public water resources education and participation in the United States of America. *Water resources education - Proceedings of international seminar on Water Resources Education 1975, Unesco & IWRA, Paris, 1975.*
8. Gunnar Lindh, (1986), *Scenarios for the preparation of guidance and audio-visual material for planners and decision makers*, IHP, Unesco, Paris, 1986.
9. ICUN, *World conservation strategy*, ICUN, Gland, Switzerland, 1980.

10. Ministry of Agriculture (1990), 'Rain-water Harvesting', Govt. of India Deptt. of Rural Development, New Delhi.
11. National Institute of Hydrology (1991), Water Conservation, NIH Publication, July, 1991.
12. Patel, C.C. 'Water availability and use', Vol. 39, The 14th Bhaikaka memcrial lecture, July, 1989.
13. Sadler, B.S. (ed), 1984, Communication methods and strategies for heightening awareness : Fourth draft 20th May 1984 (Unesco).
14. Society for water & environment conservation, Proceedings of seminar on simple methods of localised water conservation, May 17th, 1987, Areeplachy, Punalur, Kerala.
15. Syme, G., Bennett, D. & Kantola, S.J., Public participation in Australian water resources planning, Hydrology & Water Resources Symposium, 1982.
16. UNEP (1983), 'Rain and storm water harvesting in rural areas' Published by Tycoaly Inst., Ltd., Dublin, Ireland.
17. Vlachos, E., 1978, A conceptual model of the knowledge transfer process in Grigg. N. (ed), Water knowledge transfer : Water resources publications, Fort Collins, Colorado, USA.
18. Vlachos, E. and Hendricks, D.W., 1977, Technology assessment for water supplies: Water resources publication, Fort Collins, USA.

