

**EAWAG**

Swiss Federal Institute for Environmental Science and Technology  
Ueberlandstrasse 133 CH-8600 Duebendorf Switzerland



**SANDEC**

Water & Sanitation in  
Developing Countries

# **HOUSEHOLD-CENTRED ENVIRONMENTAL SANITATION**

THE TEST OF OUR PROGRESS IS NOT WHETHER WE  
ADDED MORE TO THE ABUNDANCE OF THOSE WHO  
HAVE MUCH; IT IS WHETHER WE PROVIDE ENOUGH  
FOR THOSE WHO HAVE TOO LITTLE.

**Franklin Delano Roosevelt**

by

**John M. Kalbermatten  
Richard Middleton  
Roland Schertenleib**

July 1999

# **THE HOUSEHOLD-CENTERED ENVIRONMENTAL SANITATION MODEL**

## **INTRODUCTION**

During the International Drinking Water Supply and Sanitation Decade (from 1981 through 1990), the provision of adequate supplies of safe water and facilities for the sanitary disposal of human waste received unprecedented attention. The optimistic goal of “service to all” was not achieved, but significant progress was made, not only in the addition of infrastructure, but even more in the methods used to plan and implement physical improvements for the delivery of these services.

At the end of the Decade, participants at a conference in New Delhi, taking stock of its accomplishments and recognizing the vast task still remaining, established the Water Supply and Sanitation Collaborative Council (WSSCC). The WSSCC, an expansion of the previous organization of External Support Agencies, was created to bring together professionals and organizations from developed and developing countries to promote and assist the further development of the water and sanitation sector. Recognizing the vast disparity of service provision, they also recommended a theme for the future action in the sector: “MORE FOR ALL, RATHER THAN MUCH FOR FEW”. Subsequent international conferences dealing with water resources and the environment (Riswijk, Dublin, Rio de Janeiro) called further attention to sector development needs, suggesting principles to be followed, including the one recommending that water be treated as an economic good.

Despite all this attention, progress of the sector has been uneven at best, and too slow to bring quick relief to urban poor around the world. Sanitation has been especially neglected, so much that at a meeting in Copenhagen in October 1997 the Global Water Partnership’s Technical Advisory Committee identified urban environmental sanitation also as one of the issues requiring priority attention. In November of the same year, the WSSCC, at its meeting in Manila, established an Environmental Sanitation Working Group (ESWG), the purpose of which was “to develop strategies and models to overcome barriers to progress in environmental sanitation”. The EWG was also charged to contribute to the vision for water supply and sanitation (VISION 21) that the WSSCC is preparing as a contribution to the World Water Council’s “Vision for Water, Life and the Environment”.

A sub-group of the ESWG met in Hilterfingen, Switzerland, from March 15 to 19, 1999, in order to develop a strategy to improve environmental sanitation services<sup>1</sup>, and to prepare a contribution to VISION 21. The participants developed the concept of a “HOUSEHOLD -CENTRED ENVIRONMENTAL SANITATION MODEL”, which is described in the workshop report and elaborated in more detail in this document.

## THE CASE FOR CHANGE

The large number of people around the world who still do not have access to adequate water, sanitation, drainage and solid waste disposal services provides sufficient evidence that conventional

approaches to environmental sanitation are unable to make a significant dent in the service backlog which still exists. At the same time, the world’s natural supply of freshwater is subject to increasing environmental and economic pressures. The

|   |
|---|
| <p><b>1.2 billion people do not have access to safe drinking water</b></p> <p><b>3 billion people do not have access to proper sanitation</b></p> <p><b>Perhaps 50% of all solid waste is uncollected</b></p> <p><b>No one knows how many people are flooded out each year</b></p> <p style="text-align: center;"><b>and</b></p> <p><b>3 billion people have to survive on less than US\$ 2/day</b></p> |
|---|

situation is likely to worsen dramatically unless determined action is taken, because continuing population increases and increasing per capita water demand, fueled by improving economic conditions, will further contaminate and deplete sources of water which are finite, and in many countries already over-exploited.

Water supply and sanitation services have been provided by communities to their inhabitants from the very beginning of organized settlements. The early urban settlements of the Indus basin used systems very similar to those of today: central water and sewer systems, solid waste collection from the curbside, and storm drains. These systems changed little until well into this century, when increasing populations and indiscriminate discharges of untreated wastes created intolerable pollution problems. With a better understanding of the relationship between waste disposal and environmental impact came ever more sophisticated treatment methods, intended to reduce ecological damage as much as possible. The “battle” continues; at least in industrialized countries, every new discovery of pollutant damage quickly leads to agitation for additional control measures and more sophisticated treatment.

---

<sup>1</sup> An earlier WSSCC Working Group on Promotion of Sanitation has defined ES as: "Interventions to reduce peoples' exposure to disease by providing a clean environment in which to live, with measures to break the cycle of disease. This usually includes disposal of or hygienic management of human and animal excreta, refuse, wastewater, the control of disease vectors, and the provision of washing facilities for personal and domestic hygiene. ES involves both behaviours and facilities which work together to form a hygienic environment"

Even in industrialized countries this approach - running faster and faster just to stay in place - is being questioned. Developing countries, however, generally do not have the financial, technical, or institutional resources to keep pace with increasing pollution and the parallel need to improve environmental sanitation services. Moreover, industrialized countries have had comparatively much more time to deal with these problems; in developing countries, especially those with fast-growing economies, this process has been compressed into one generation or less. In consequence, the sanitary and environmental conditions in the peripheral urban areas in developing countries (often illegal, and usually the epicenter of population growth as a result of urbanization) are generally abysmal, and rural sanitation is lagging far behind the progress made in water supply provision.

During the Decade, a great deal was learned about how to improve water supply and environmental sanitation, and intermediate technologies were developed and applied which could help alleviate the present unsatisfactory conditions. A great deal is known today about ways to overcome most of the existing obstacles standing in the way of successful environmental sanitation, not only about technologies, but also about the methods of community participation essential to create sustainable solutions. Of course, new inventions will improve the effectiveness of solutions as time goes by, just as developments in treatment systems have improved drinking water and effluent quality, **but effective solutions to environmental sanitation problems can be implemented now, using existing technologies, systems and approaches.**

Although there are many reasons for the failure to achieve satisfactory sanitation coverage (see box), it is clear from the foregoing, that poor planning, rather than the lack of knowledge or tools, lies at the heart of current shortcomings in environmental sanitation. At present, too often only lip-service is given by environmental sanitation professionals to environmental management issues. Services are not conceived in an integrated way that takes into account all their potential impacts. For example, provision of a water supply without allowing for the removal of wastewater may create standing water, thereby producing health hazards and poor living conditions which may outweigh its positive benefits. Nor is sufficient attention paid to the fact that the reduction of waste and the more efficient use and reuse of water and materials is the most effective way to reduce demand for waste treatment and disposal. **The need for holistic and integrated planning has been insufficiently recognized.**

|  |
|--|
| <p><b>Why isn't sanitation happening?</b></p> <ul style="list-style-type: none"><li>• Lack of political will</li><li>• Low prestige and recognition of the importance of sanitation</li><li>• Poor policy, at all levels</li><li>• Poor institutional frameworks</li><li>• Inadequate and poorly-used resources</li><li>• Inappropriate approaches</li><li>• Neglect of consumer preferences</li><li>• <span style="float: right;">on and low</span> public awareness</li><li>• "Women and children last"</li></ul> <p>Source: WSSC Working Group on Promotion of Sanitation</p> |
|--|

There has also been a tendency to develop systems that respond to problems of environmental waste management as perceived by policy makers and professionals,

rather than to households' and communities' perceptions of their actual needs. Decisions regarding interventions -- especially those requiring sophisticated technology, such as sewerage -- are commonly taken at a political or administrative level far removed from the people to be served. This frequently results in the refusal of the supposed users of services to accept operational or financial responsibility, thereby jeopardizing the sustainability of the service. **To promote user ownership of services, decisions should be taken at a level as close as possible to the source of the problem, in consultation with the people most directly affected.**

Therefore, on grounds both of human need and of better environmental management, it is important for the environmental sanitation community to radically re-direct its thinking. Any vision of environmental sanitation for the 21st century needs to identify efficient, sustainable and cost-effective ways of providing service that have the capacity to balance improvements in the quality of people's lives with support for the well-being of the environment.

Many of the tools and approaches which can contribute to the solution already exist, and have been implemented individually. The efforts of the working group were not directed towards inventing new technologies or methods, but to using what is available today, and by developing a holistic approach, to making all of the services more effective; that is, making the whole bigger than the sum of its parts. That attitude will allow the utilization of methods, technologies and approaches already tested in practice, but in ways that offer the promise of making them more effective. It eliminates lengthy development and research prior to implementation, thus encouraging a quick response to the obvious demand for environmental sanitation improvements. (Not that innovations should be discouraged. As potential new solutions are identified, they should be developed and piloted as necessary, laying the groundwork for future breakthroughs.)

## **ENVIRONMENTAL SANITATION**

### **Goals**

The goal of environmental sanitation is to contribute to the improvement of quality of life and the achievement of social development. Building on the earlier WSSCC Working Group definition of environmental sanitation, the group considered that environmental sanitation should create and maintain conditions whereby:

- **people lead healthy and productive lives;** and, at the same time,
- **the natural environment is protected and enhanced.**

To achieve these conditions, the group considered it essential to provide:

- **Water and sanitation for all, within a framework that balances the needs of people with those of the environment in order to support healthy life on earth.**

The principles to be employed in achieving these objectives include:

- focussing on people;
- meeting basic needs;
- serving the unserved;
- improving public health;
- reducing the impact of poverty;
- ensuring environmental, social, institutional, economical and financial sustainability;
- designing improvements to respond to effective demand
- preserving and protecting the resource base
- protecting or enhancing ecological integrity

### **Components**

To achieve these goals, using the principles described, environmental sanitation should include:

- On- and off-site disposal of human wastes
- Wastewater disposal
- Solid waste disposal
- Storm water drainage

For a healthy environment, people of course need not only these environmental sanitation components but also a safe and reliable water supply. Holistic planning of the water supply and the environmental sanitation elements is essential, and the present lack of synergism, discussed below, is a serious problem. However, the meeting considered that including water in the components listed above would not be desirable. In the past there has been an overwhelming emphasis on water supply, to the detriment of sanitation, and it is time to try to redress the balance. Therefore it is suggested that only two specific aspects of water supply should be considered. The first is the availability of the amounts of water needed for proper hygiene and healthy living (if the existing water supply does not reach this level, then it will in any case almost certainly be identified as a priority under the HCES model). The second is the inter-relationship between water supply and other sanitation services, for example the disposal of wastewater, or the impact of water conservation on the feasibility of various sanitation options.

### **The Present Lack of Synergism**

A major contributing factor to the existing situation is the lack of coordination between the number of different organizations responsible for the different sub-sectors. Typically, there are separate agencies or organizations responsible for potable water supply, wastewater disposal, removal of sludge from on-site sanitation, storm water drainage, and solid waste collection and disposal. This approach ignores the unavoidable inter-relationships between these services, and the efficiency gains that can be achieved if they

are provided as part of some overall coherent strategy. For example, the technical literature reports the detrimental impact of the lack of solid waste removal on the operation of storm drainage systems, because open drains are used as receptacles of solid waste. Similarly, reports describe the unsanitary conditions resulting from the flooding of on-site and off-site waste and wastewater facilities as a result of inadequate storm water drainage. Finally, inadequate disposal of water after it has been used can result in ponding of wastewater, which creates an ideal environment for disease vectors and can destroy whatever health benefits were anticipated through the supply of potable water.

Water supply is usually accorded priority in any attempt to provide services. In industrialized countries, on-site disposal of wastewater is strictly controlled, or sewers are built as soon as on-site disposal is no longer appropriate. This is done in recognition of the fact that wastewater requires proper disposal if human health and the environment are to be protected. In less developed countries, particularly away from the core of cities where more affluent inhabitants can afford waste disposal facilities, obtaining water supply usually exhausts a community's resources, and the disposal of wastewater is not financially possible without substantial support from sources outside the community (there are a number of other reasons for the failure to achieve satisfactory sanitation coverage, as listed in the box on page 4, but insufficient funding is certainly a factor in almost every case). The unintended consequence of concentrating investments on potable water supply, usually in amounts that cannot be disposed off on-site, is the deterioration of the local environment and often an increase of diseases such as cholera.

There are rare cases where water supply and wastewater disposal are the responsibility of the same organization, and this usually results in a more coordinated approach to water supply and wastewater disposal investments. However, such combined organizations typically focus on piped systems for water supply and waste disposal, and have little or no concern for on-site sanitation systems, which predominate in low-income squatter areas. Equally, solid waste removal is rarely the responsibility of a water and wastewater organization, and even more rarely is it the responsibility of the institution in charge of building and operating storm water drainage systems. In fact, storm water drainage systems are usually not "operated" in any normal sense; much to the delight of rats and other disease carriers, the accumulation of debris and solid waste is not addressed until flooding occurs in the rainy season (and sometimes not even then).

The benefits of synergism can be obtained through better coordination of the activities of the different organizations responsible for the various sub-sectors. The organizations do not have to be merged for that purpose, although there are some successful institutional models where the same organization is responsible for water supply, wastewater disposal and solid waste collection, and a few that have additional responsibilities. The anticipated benefits and costs of merging different organizations should be carefully evaluated (including lengthy transition periods while new legislation is passed, organizations restructured, accounting and management systems reconciled, etc.), and compared with the benefits which can be achieved simply through better coordination of both investment and operation of separate existing entities.

Experience shows, however, that at the very minimum planning of future investments should always include an assessment of the needs of all environmental sanitation sub-sectors (and of water supply), so that investments can be made on the basis of overall priorities. For example, additional storm drainage investments might well not be necessary, if solid waste could be collected more effectively, or water demand management might not only eliminate the need for additional source development, but also save even more by reducing the need for wastewater disposal investments. In more general terms, there appear to be considerable advantages in thinking in holistic terms and using functional divisions (planning; safeguarding public health; environmental protection; waste minimization, resource recovery and final disposal; etc.), rather than service-by-service. This integration has to start at the household level, since it is users' perceptions and priorities that determine sustainability. **Future investment planning should consider all environmental sub-sectors and decisions should be based on overall priorities and maximize the benefits of synergism.**

## **THE HOUSEHOLD CENTERED MODEL**

### **Background**

Literature reflecting experience over the past 10 to 15 years, mostly in water supply but increasingly in environmental sanitation, emphasizes the need to involve stakeholders in the process leading to investment decisions and in the subsequent operation and maintenance of facilities. ("Stakeholders" in this sense means all those who have an interest in the services to be provided, ranging from the users themselves up to the regulatory bodies at the national level; however, the major shift in recent years has been the emphasis on the importance of consulting the users and local communities.) During the Decade, with its massive efforts to accelerate investment in facilities (most pronounced in rural water supply), the recognition grew that sustainability depended to a great degree on the users' understanding of the need for proposed improvements and their purpose. In parallel, the idea gained widespread acceptance that investments should be based on "effective demand"; that is, that facilities should be provided only if the prospective users stated that they were willing and able to cover some or all of the investment costs (directly in cash, or by in-kind contributions of labor and materials) and at least all of the costs for operation and maintenance.

At the same time, sector officials realized that similar approaches were needed for the rapidly growing urban peripheral areas, where urban authorities were unable to provide adequate water supply and environmental sanitation infrastructure to keep pace with the influx of rural populations and low-income people seeking affordable shelter. Alternative approaches to infrastructure delivery, emphasizing community participation, were developed, in order to provide at least a minimal level of service in these areas. As time passed, it became clear that the centralized service organizations, dominated by technical staff accustomed to providing conventional service to those who could afford it, had little interest and fewer skills in organizing and working with low-income groups.



In an effort to achieve sustainability of services, Non-Government Organizations (NGOs), Community-Based Organizations (CBOs), and dedicated individuals, developed approaches, often referred to as “bottom-up” to distinguish them from the “top-down” methods favored by centralized organizations, in order to work effectively with peri-urban and rural people in need of water supply and environmental sanitation. There are now many successful examples of participatory efforts using simple and affordable technologies and planning tools developed by various organizations during the Decade.

Sustainability required not only that users should be willing and able to pay for services and to operate them. In addition, national and local planners and External Support Agencies (ESAs) had to help in the development and implementation of a number of new approaches, such as: strategic planning of environmental sanitation; methods of effective stakeholder participation; and cost policies which users could understand and were prepared to accept. Here the record is more varied. Many ESAs are unwilling to accommodate the lengthy time needed for effective stakeholder participation, and often consider this approach to be of value only at the local level, especially in low-income communities. Cost recovery remains a difficult topic, not so much for the users who have to make daily decisions about which services they wish to purchase, but rather for the policy-makers, who are to far removed from the daily life of peri-urban and rural populations to understand their needs and priorities, or the ways in which they have to budget for the bare necessities of life.

One of the major innovations has been the introduction of strategic sanitation planning as a tool to match users’ priorities and preferences with affordability. This is an important step forward in putting into practice the lessons learned from the Decade. However, initial efforts at applying it have illustrated a number of (not unexpected) difficulties. Although it is based on user participation, it tends in fact to be “top down”, in the sense that the required skills are rarely found at local level (and in fact tend to be provided through ESA support; the approach is not used in the absence of ESA involvement). It requires a “planning culture” which is often missing in developing countries (especially in agencies responsible for sanitation, which tend to be weak). It tends to be time-consuming and expensive to apply, which means that it cannot yet be considered as an approach suitable for addressing the overall needs of the sector. It is also sector-specific, meaning that it focuses entirely on what sanitation system users prefer. This is not a problem until one considers UES needs in a holistic sense, when the users’ overall needs and priorities have to be taken into account (in the context of a household budget which also has to cover food, shelter, education, health care, and many other items), and when the policies and capabilities of a range of UES sector organizations have to be taken into account. At the present time the strategic sanitation approach has not been expanded to cope with such complexities, and realistically it may be some years before it can begin to; probably the immediate priority is a careful evaluation of its effectiveness as a single-sector planning tool, before moving on to the far more challenging task of multi-sectoral planning.

The fact that the ESAs are still having problems, 40 years after their first entry into the water and wastes sector, in finding planning tools that meet the needs of the developing

countries, is unfortunate, but does not alter the fact that the populations of these countries still have to make daily decisions on how to provide for themselves. Whatever the deliberations of ESAs at international meetings, low-income people will still have to decide what they are prepared to spend on water supply, what form of sanitation might meet their needs, and so on. While more sophisticated planning tools are being developed, the consensus of the meeting in Hilterfingen was that an immediate need is for a decision system that is simple, can be easily understood by the users, can be applied with skills that are locally available as much as possible, and which, while not necessarily producing “correct” solutions (e.g., ones perceived as optimal in a macro-economic sense), helps users to avoid taking decisions that are later found to be seriously wrong.

The meeting of the ESWG therefore concluded that:

**The many effective and successful initiatives have not yet been combined into a unified strategic planning tool which could be used for a comprehensive analysis of urban environmental sanitation needs and the systematic planning of service improvements. The Household-Centered Environmental Sanitation model aims to fill this gap. It has been developed in the context of environmental sanitation, but could equally be applied to water demand management, and indeed to integrated water resources management.**

## **Principles**

The HCES model is based on the following principles:

- Stakeholders are members of a “zone”, and act as members of that zone (“zones” range from households to the nation). Participation is in accordance with the manner in which those zones are organized (for example, communities and neighborhoods consist of households, towns consist of communities, etc.). Zones may be defined by political boundaries (for example, city wards and towns) or reflect common interests (for example, watersheds or river basins).
- Decisions are reached through consultation with all stakeholders affected by the decision, in accordance with the methods selected by the zone in question (for example, votes at national level in a democratic system, town hall meetings at local level, or informal discussions at neighborhood level).
- Problems should be solved as close to their source as possible (for example, where feasible, a community should provide services to households within it; common wastewater treatment facilities for several communities should be provided by a consortium of the communities). Only if the affected zone is unable to solve the problem should the problem be “exported”, that is, referred to the zone at the next level.
- Decisions, and the responsibility for implementing them, flow from the household to the community to the city and finally to the central government (there may also be intervening zones that need to be considered; for example,

wards within the city, districts within a province; or provinces within the nation). Thus, individual households determine what on-site sanitation they want; together with other households, they decide on the piped water system they want for their community, together with other communities, they determine how the city should treat and dispose of its wastewater. Policies and regulations are determined by central government, with implementation delegated to the appropriate levels flowing towards the household (thus national standards define storm water disposal requirements, but the city issues local building codes).

### **Structure of Decision-Making**

The conventional approach to water supply and environmental sanitation is based on a highly-centralized system of decision-making, usually under the control of the national government. In recent years, many governments have attempted to decentralize, first by deconcentrating their functions, then by delegating these functions to second- and third-tier governments (for example, to provinces and municipalities). Eventually, some governments have devolved responsibility for service provision to local authorities.

The results of these efforts have been mixed. Deconcentration and delegation leave central policy-makers in charge, and do little to encourage initiatives by local office-holders and managers - decisions are still made at the center, which also holds tightly onto the purse strings. Devolving responsibilities altogether overcomes the problems afflicting deconcentration and delegation, because under this transfer of responsibility, central organizations of government relinquish all power to interfere with local management of services.

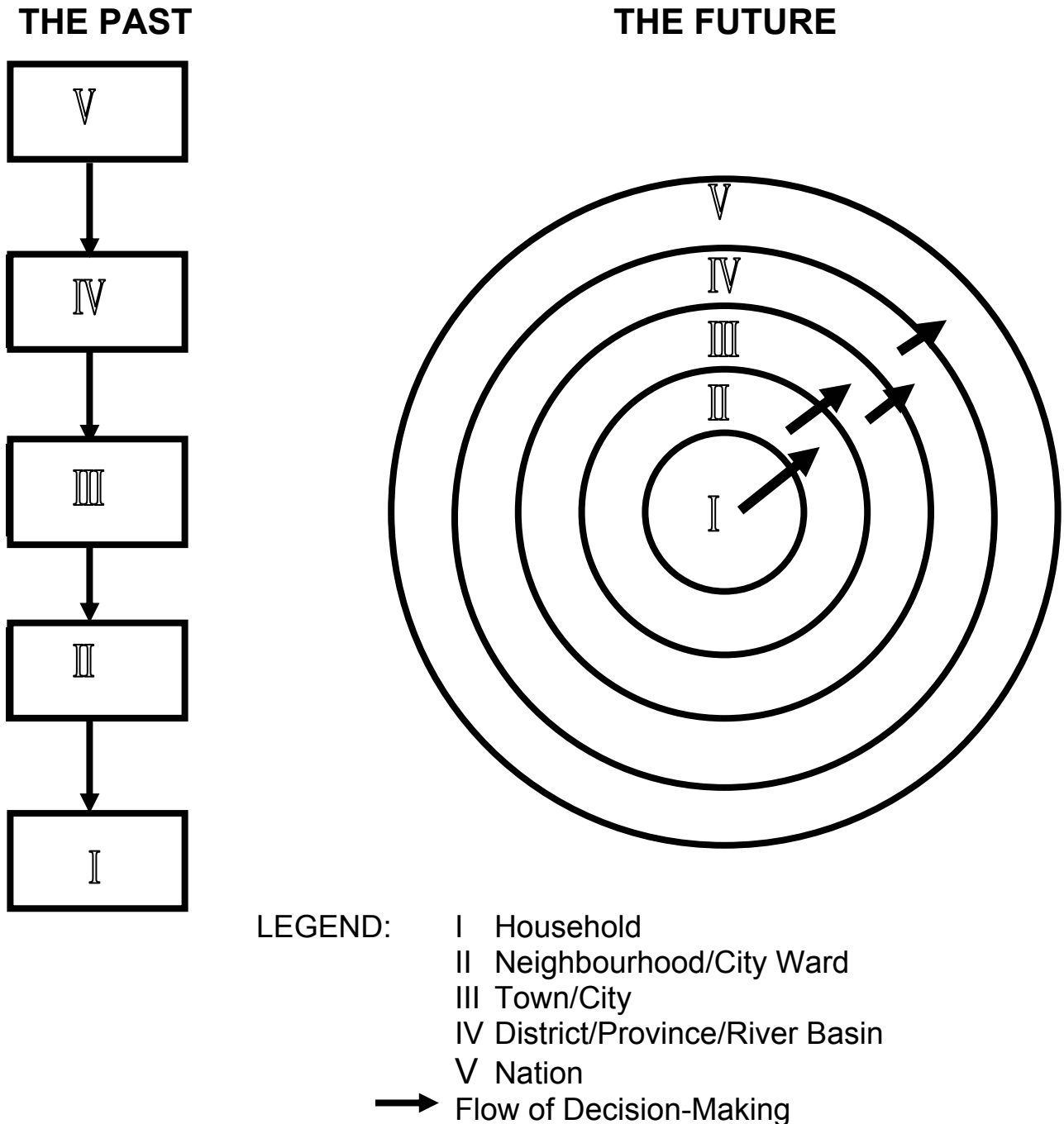
The problems with devolution generally result from the fact that only the new responsibilities, not the means of implementing them, are transferred to the local authorities. Frequently the government neither relinquishes its revenue-generating powers, nor provides the local authorities with the funds necessary to successfully operate the services for which they are now responsible.

Obviously, no structural change in government organization can overcome the fundamental problem resulting from a delegation of responsibility without the simultaneous transfer of the authority to act on that responsibility. The HCES model is therefore predicated on the provision of authority to act on responsibilities assigned to the stakeholders at whatever level the decision is appropriate.

Figure 1 below presents graphically the methods which have tended to govern the environmental sanitation sector in the past, and the approach proposed under the HCES model. Each circle represents a different zone, from the household to the nation.

Figure 1

## DECISION MAKING IN



The fundamental difference between past practice and the HCES model is that people become the focal point. HCES does this by using the smallest organizational unit established to serve people's common interest, the household, as the core of the planning process. The HCES model ensures that decisions on service delivery and technology selection are made by stakeholders, by asking why the stakeholder themselves cannot solve a given problem, and what help do they need in order to identify and implement a solution. As a consequence, the HCES model promotes sustainable solutions and self-sufficiency at every level of the decision-making process (that is, within each Zone), and external assistance is provided, by the next zone or (rarely) by central government organizations, only for those functions which are clearly beyond the capacity of the implementing community.

## IMPLEMENTING THE HCES MODEL WITHIN EACH ZONE

### Application

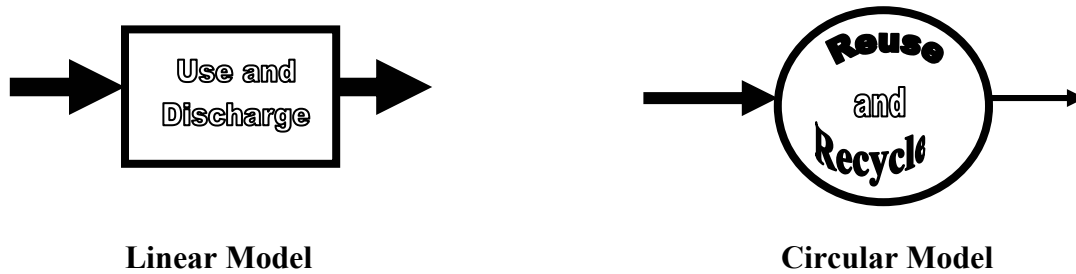
Just as it is true that most of the principles of the HCES model planning process have been used in the past, but not in a holistic or consistent manner, so have many of the implementation principles been used, but similarly, in an inconsistent and piecemeal fashion. As a result, the benefits of synergism have rarely been realized, and interventions in one sub-sector have often proved to be detrimental to the community because they have aggravated problems in another sub-sector (for example, providing water supply without wastewater disposal, negatively affecting public health). The fact that reducing water demand for non-essential uses has an impact not only on source development but also on waste water treatment and disposal investment needs is more often disregarded than applied in water resources planning. Fortunately, integrated water resources management is becoming more important as many more locations experience water scarcity, and so there will be considerable pressure to think in holistic terms rather than on narrow sectoral lines.

The one notable exception to this piecemeal use of these principles is the concept of "circular systems" described by J.R. Sheaffer in 1983. Figure 2 below graphically presents the linear and the circular systems.

**The linear system imports water and other goods into a community, uses them once and discharges them from the community. The circular system imports water and other goods into a community, manages demand for maximum efficiency, reuses and recycles water and other goods to reduce waste volume and optimize environmental benefits.**

Sheaffer, J.R. and Stevens, L.A.: Future Water. William Morrow and Company, Inc., New York, USA, 1983.

Figure 2



### Implications of applying the HCES model

However the boundaries of each zone are defined<sup>2</sup>, implementation of the HCES model requires stakeholders within the zone to plan and implement environmental sanitation infrastructure and service delivery in a manner that is sustainable with the resources which are available to them within the zone (or which can be made available from another zone). The approaches that should guide them in arriving at such sustainable solutions within each zone include some or all of the following:

- **Water demand management**, in order to minimize wasteful use of water, and so reduce the need for new source development and limit the production of wastewater;
- **Reuse and recycling of water**, in order to minimize the need for wastewater collection, treatment and disposal;
- **Solid waste recycling**, in order to reduce the burden of collecting and disposing of solid wastes;
- **Nutrient recovery**, whether at the household level (for example, eco-sanitation), or on a wider scale (for example, urban agriculture);
- **Improved rainwater management**, reducing runoff by on-site or local measures, including detention and treatment, and the reuse of stormwater to benefit the community, such as storage for fire fighting and recreational or amenity use, thus reducing uncontrolled discharge to surface waters;
- **Strong emphasis on intermediate technologies**, so as to encourage household- and community-level construction, operation and management of facilities, and permit reuse and/or disposal at the local level;
- **Institutional arrangements and mechanisms** that stress the involvement of the users, encourage the participation of the private sector, facilitate cooperation across zone or sub-zone boundaries (such as wholesale – retail

---

<sup>2</sup> It should be noted that the boundaries appropriate to each of the various sub-sectors may not be identical. A fundamental exercise in establishing the HCES model is therefore to determine how best to treat the study area in terms of zones and sub-zones, as well as of sectors and sub-sectors. This is probably best resolved through an analysis of actual case studies, rather than as an abstract theoretical concept.

relationships for service delivery), and ensure the provision of technical assistance across zone boundaries where needed;

- **Economic analysis procedures** that clearly illustrate the economic benefits of good planning as well as the consequences of sub-optimal development (for example, in terms of environmental damage; wasteful use of water, energy or other resources; or relying on imported skills and equipment and so failing to make the best use of local resources);
- **Effective and sustainable financial incentives** to encourage the adoption of economically-desirable alternatives;
- **Financial procedures** that determine whether problems should be solved within the zone itself, or whether a joint solution should be selected to serve more than one zone (for example, a city-wide system serving a number of wards). Where economic and financial considerations indicate that a shared solution is preferable, appropriate cost-sharing mechanisms need to be established.
- **Cost recovery practices** (predominantly user charges in Zones I and II; tax revenues elsewhere) that ensure financial viability, are socially equitable, and promote the “circular system” and the productive use of “wastes”.

In summary, programs and projects designed in accordance with the HCES model will, like all successful and sustainable development efforts, have to address all aspects of development: social, institutional, economic and financial, and technological. The difference is that they will truly be “bottom up”, beginning with the preferences and capabilities of the household. Much of the present “conventional wisdom” in the UES professions is likely to suffer readjustment as a consequence. Some of the potential benefits, in comparison with those from a more traditional “top-down” approach, are suggested below.

Systems for today should be based on an assessment of today's demands, knowledge, technical and financial abilities and local conditions, not on solutions of the past developed incrementally under different conditions and over a long time, on the basis of knowledge or assumptions now known to have been wrong. In short, **the lessons, not the solutions, of the past should guide the sector's progress.**

### **Socio-cultural aspects**

Starting at the household should help to ensure that the solutions being proposed truly match users' expectations and fit in with prevailing cultural patterns. Supporting materials, for example for program promotional and hygiene education, can be more closely tailored to users' perceptions. Participation (especially by women, the prime actors in household-level UES) should be enhanced if it is a basic part of program design (“What do you want to do, to help yourselves?”), rather than an element added on as the lowest level of an implementation pyramid. Equitable access to service should be more easily assured if the needs of all members of the community are taken into account as early as possible in the planning process.

### **Institutional aspects**

If the institutional framework has to develop from the household level and build outwards, it should evolve in a way that creates a more effective relationship, based on trust and mutual confidence, between the users and the existing institutional environment. Understanding the roles of both men and women in ensuring satisfactory household services, and the ways in which communities reach decisions and manage common affairs, should help develop sound solutions. The important role of the informal sector in construction and operation of UES services (for example, latrine construction and emptying; solid wastes collection and recycling) should be much better appreciated and incorporated into the longer-term framework. It should also be easier to identify and address problem areas that often result in failure. Understanding of users' lack of knowledge and necessary skills will enable planners either to include programs to meet these gaps, or to redesign the framework so that appropriate external assistance is given (from the next zone, or from the private sector). Potential problems with codes and regulations that often inhibit the provision of UES in low-income or squatter settlements (not only those dealing with technical matters, but also, for example, those concerning tenure and landlord-tenant relationships) can be identified and addressed at an early stage.

### **Economic and financial aspects**

Taking household priorities as the starting point for developing UES services should ensure that "effective demand" is at the heart of all investment decisions. To the extent that it is not (for example, in the case of sewage treatment and other measures to protect the environment, which often cannot be funded on a "willingness to pay" basis), then household-level consultations will quickly reveal the need to consider the wider aspects of UES benefits, and to arrange for suitable mechanisms for transferring funds, if programs are to be financially sustainable. Knowledge of existing methods adopted for financing major household expenditures and for collecting regular payments for household debts should enable both financing and cost recovery mechanisms to be more closely matched to familiar and acceptable means. Affordability at the household level should be enhanced through the emphasis on intermediate technologies and on technology selection criteria which favor labor-intensive and locally-managed solutions and the use of the informal sector; all of these approaches provide a chance for increasing household incomes and so make the services more affordable.

### **Technological aspects**

The technologies needed to implement the HCES model successfully are available today, but often not regarded as "respectable" by sector professionals who have a technical rather than a service orientation. However, the model's emphasis on participation by



stakeholders (who will question technical experts about the efficacy and affordability of what they propose) and on solving problems as near to their origin as possible rather than exporting them, should result in a re-examination of current approaches. Many conventional practices are at least questionable at a time when population increases are stressing water resources in many countries. For example, is it really appropriate under such circumstances to continue with the practice of using water as a transport medium, using tons of water to transport pounds of excreta to a distant point, where the water and excreta then have to be separated again? That method of conveyance, treatment and disposal was invented in a time of abundant water resources per capita, and when there was little knowledge about environmental impact of waste discharges. Today, armed with the knowledge of a century of rapid scientific progress, blind adherence to a waste disposal system thousands of years old does not seem an adequate response to environmental and health concerns.

If I urinated and defecated into a pitcher of drinking water and then proceeded to quench my thirst from the pitcher, I would undoubtedly be considered crazy. If I invented an expensive technology to put my urine and feces into my drinking water, and then invented another expensive (and undependable) technology to make the same water fit to drink, I might be thought even crazier. It is not inconceivable that some psychiatrist would ask me knowingly why I wanted to mess up my drinking water in the first place.

The “sane” solution, very likely, would have me urinate and defecate into a flush toilet, from which the waste would be carried through an expensive sewage works, which would supposedly treat it and pour it into the river - from which the town downstream would pump it, further purify it, and use it for drinking water.

Private madness, by the ratification of a lot of expense and engineering, thus becomes public sanity. This is permitted by our habitual disregard of consequences. We live by buying and selling the causes of every conceivable blight from cancer to famine to holocaust - and are continually astonished to find that these causes have their inevitable effects. As a society, we never look behind us at the generations that will follow us and at the impediments we are throwing in their way.

Excerpt from: Wendell Berry, foreword to Sim Van der Ryn: “The Toilet Papers: Recycling Waste and Conserving Water”. Ecological Design Press, Sausalito, CA, USA, 1995