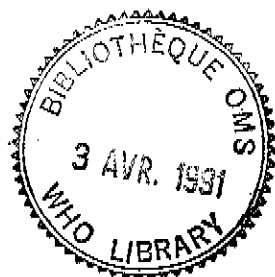


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WATER SUPPLY AND WASTEWATER MANAGEMENT

LEGAL ISSUES IN WATER RESOURCES ALLOCATION WASTEWATER USE AND WATER SUPPLY MANAGEMENT

**REPORT OF A CONSULTATION OF THE FAO/WHO
WORKING GROUP ON LEGAL ASPECTS OF WATER
SUPPLY AND WASTEWATER MANAGEMENT
(GENEVA, 25-27 SEPTEMBER 1990)**



WORLD HEALTH ORGANIZATION, GENEVA, 1990

This report presents the recommendations of a FAO/WHO consultation on legal constraints which have hampered the development of domestic water supply and sanitation (Geneva, 25 -27 September 1990). The major issues identified and addressed by the Working Group on Legal Aspects of Water Supply and Wastewater Management included the reallocation of water resources to ensure that preference is given to the domestic user, the institutional and legal framework required to optimize water supply planning and management, and the legal regimes for wastewater use. Case studies and other contributions of members of the Working Group are summarized in annexes to the main report.

Mr L. Laugeri, WHO/CWS, Secretary of the Consultation.

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ABBREVIATIONS

CWS	Community Water Supply and Sanitation
DOHS	Department of Health Services
DWR	Department of Water Resources
EIER	Ecole Inter-Etats des Ingénieurs de l'Équipement Rural
EPFL	Ecole Polytechnique Fédérale de Lausanne
FAO	Food and Agriculture Organization of the United Nations
FDWR	Federal Department of Water Resources
GTZ	German Agency for Technical Cooperation
HLE	Health Legislation
IRC	International Water and Sanitation Center
LEG	Legal Counsel
LGA	Local Government Authority
NANC.I.E.	Centre International de l'Eau de Nancy
NGO	Non-Governmental Organization
PEC	Primary Environmental Care
POR	Portugal
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board
UN/DTCD	United Nations Department of Technical Cooperation for Development
UNDP	United Nations Development Programme
USEPA	United States Environmental Protection Agency
WSS	Water Supply and Sanitation
WHO	World Health Organization
WPRO	Western Pacific Regional Office

INTRODUCTION

The Consultation

A consultation was held at the Headquarters of the World Health Organization (WHO) in Geneva, from 25 to 27 September 1990, to address selected legal issues in water supply and wastewater management. The 20 members of the Consultative Group included Mrs M. Cardoso da Silva, Manager, UNDP/WHO project, POR/82/005, "Development of Water and Sanitation Technologies", Portugal, Chairman; 8 other senior water supply and sanitation (WSS) specialists from countries of various WHO Regions; 5 representatives of bilateral and international support agencies; 5 WHO lawyers, economists and engineers; and Dr D. Caponera, senior water legislation expert, WHO Consultant.

The Secretariat was provided by Mr S. Burchi, legal officer, Development Law Service, Food and Agriculture Organization (FAO) of the United Nations, and Mr L. Laugeri, Technical Officer, Community Water Supply and Sanitation (CWS) Unit, WHO. The complete lists of participants by commissions and members of the FAO/WHO Working Group on Legal Aspects of Water Supply and Wastewater Management are in Annex I.

The consultation was opened by Dr D. Warner, Manager CWS, who welcomed the participants and recalled the background and objectives of the meeting. During the Third World Conference on Water Law and Administration (Alicante, 11 - 14 December 1989), WHO/CWS had made a presentation on the financial, legal and institutional constraints which hampered water supply and wastewater management. In February 1990, the Development Law Service of FAO and the CWS Unit of WHO had agreed informally to cooperate in a study of the most important legal issues, and to prepare a document illustrating difficulties encountered in water resources allocation, wastewater use and cost recovery, as a result of absence of regulations or inadequacy of the relevant legal provisions.

The Development Law Service of FAO had undertaken initial studies on the preferential status of community water supply in resource allocation, and on wastewater use rights and restrictions with respect to health and environmental protection. The Water Resources Branch of the United Nations Department of Technical Cooperation for Development (UN/DTCD) had prepared a document entitled "Legal and Institutional Factors Affecting the Implementation of the International Drinking Water Supply and Sanitation Decade". (UN/DTCD, Natural Resources/Water series, number 23). The CWS Unit of WHO had written an issues paper based on these extensive contributions, to be used as a background document for the consultation.

The scope of the consultation was to address legal mechanisms for sound water management, with special emphasis on domestic and agricultural water use, in the following areas:

- (i) - preferential status of community water supply in resource allocation;
- (ii) - wastewater user rights, and restrictions with respect to public health and environmental protection;
- (iii) - enforcement and recovery of water withdrawal and wastewater use charges, and other regulatory measures to achieve sustainability and improvements in community water supply and sanitation.

The objectives of the consultation were as follows:

- to review selected experiences in order to arrive at a more precise definition of the outstanding legal issues in areas (i), (ii) and (iii) above;
- to provide approaches and methodologies for dealing with these issues;
- to disseminate the results of the discussions, with a view to generating action programmes from governments and external support agencies, and providing elements of technical information to professionals in the field;
- to advise FAO, WHO and other external support agencies of the role which they should play with respect to major legal constraints which hamper rational water resources management in many countries, and in assisting governments in their efforts to overcome these constraints.

These subjects were introduced and illustrated by Messrs Burchi, Caponera and Laugeri, who developed the various issues to be addressed by the consultation. Mr Solanes, Interregional Adviser Water Law, UN/DTCO, presented a summary of institutional issues in WSS, with case studies and suggestions for future research and preparation of model legislation. The other presentations in plenary sessions included a historical review of regulations governing wastewater use in agriculture, by Professor H. Shuval, University of Jerusalem (Annex II), a technical paper on water source protection, by Mr J.T. Visscher, IRC International Water and Sanitation Centre (Annex III), and a case study on prevention of industrial and domestic pollution in Portugal, by Mr J. Roxo Pires, project POR/82/005 (Annex IV).

The Commissions

During its discussions in plenary, the Working Group redefined the three major issues or groups of issues which were to be addressed by the commissions, as follows:

- Commission I. Reallocation of Water Resources;
- Commission II. Legal Regimes for Wastewater Use;
- Commission III. Institutional Issues in WSS Management

The findings, conclusions and recommendations of each Commission are presented in the following sections of this report, with relevant chapters of the background document summarized in Annexes.

Summary of Recommendations

The report of Commission I emphasizes the need to ensure that governments have the legal power to allocate and reallocate water use rights, giving priority to household consumption to satisfy the basic needs of the population. The implementation of this recommendation requires the existence within governments of a water rights administration. Provisions for integrated water resources planning, mechanisms for community involvement, and regulations for the protection of catchment areas should be included in the legislation. The capacity of water agencies and users' associations to manage water systems should be enhanced. Simple techniques of sanitary inspection of water supplies should be adopted, and the establishment of effluent standards for the purpose of controlling water pollution should be encouraged.

The Commission recommends that assistance be provided to developing countries in the implementation of these measures, particularly to draft appropriate legislation, to improve the effectiveness of water rights administration, to promote integrated water resources planning, and to improve the ability of water agencies and users' associations to manage water systems. Three studies are further recommended:

- a compilation of water legislation representing different legal and cultural settings;
- a comparative study of legal mechanisms for the reallocation of water resources to priority users, with special regard to domestic consumption;
- a comparative study on legislation governing the provision of water supply and sewerage services to the public.

The report of Commission II emphasizes the need for governments to control the allocation of raw wastewater and the use of treated wastewater. Specific measures should be taken to protect public health and the environment from the potential adverse effects of wastewater use. The rights of the users who rely on the return flow should be protected against losses which occur as a consequence of treatment and use. The legislation for the management of wastewater should reflect the operational requirements of the sewerage system which provides the effluent to be used. It should also be consistent with the legal provisions governing the management of water resources and the specific regulations concerning water supply, sewerage and pollution control. Careful coordination is required between the various government institutions involved. User charges are justified to encourage the rational use of the resource.

The Commission recommends that assistance be provided to developing countries in the delineation of legal regimes for wastewater management, and further recommends comparative studies of existing legislation, cost/benefit analyses of projects designed to implement and enforce new or existing regulations, and an intensified commitment of external support agencies active in this field.

The report of Commission III emphasizes the need for the institutions of the WSS sector to achieve sustainability. This requires improvements in financial performance, particularly through the enforcement and collection of charges in relation to water supply and wastewater disposal. These charges should reflect the value to the economy of all WSS production factors, and they should be paid by the users, in order to promote the rational use of all resources required for the provision of the WSS services. Tariff structures should be implemented to reflect variations in income, consumption and willingness to pay between different user categories. The owners of facilities used in private water abstraction should also be taxed and assessed, either for the used water, or for the performance of the activity requiring water. In its recommendations, the Commission emphasizes the need for simple structures and mechanisms for administering WSS charges, and suggests that external support agencies assist governments in preparing a model and a checklist of issues which will facilitate the drafting of tariff legislation.

The Commission also recognizes the need for more rational WSS sector planning and project appraisal methods, and suggests that more uniformity should be achieved in project design, through the implementation of guidelines and procedures of general value, with assistance from external support agencies as required.

In its discussions on institutional development, the Commission recognizes the financial constraints which are faced by the public sector, and the need to find new alternatives for the mobilization of resources. The treatment of the WSS sector as a public monopoly has eliminated alternative institutional arrangements, which could have resulted in more active involvement of the private sector, with its advantages in terms of staff, financial resources, flexibility and efficiency. The Commission recommends that the potential role of the private sector in WSS should be assessed, and that alternative institutional frameworks be identified in order to make this participation effective without affecting fundamental public interests. External support agencies could assist governments in reviewing experiences of private sector participation in selected countries, and preparing a state of the art report, which should include the identification of the issues to be addressed and costs and benefits to be expected, when considering the possibility of increasing the role of the private sector in WSS.

The report of Commission IV contains three specific proposals:

- drafting a model ordinance in water tarification, assessment and collection of tariffs, taking into account comparative legislation;
- suggesting administrative mechanisms to improve collection;
- preparing legal guidelines for the assessment of WSS programmes.

PROBLEM DEFINITION

In the current period of growing depletion and pollution of water resources, and dramatic increases of the population groups at high health risk, the provision of water and sanitation services is difficult and costly. Communities as well as government agencies are faced with managerial and technical constraints, compounded by lack of adequate human and financial resources. Because of the rapidly evolving demand for WSS services and their increasing diversity, there is need for forward-looking legislation which can be easily implemented and enforced.

Developing countries have tended to adopt imported standards and practices, resulting in reliance on central public systems. The role of local administrations and communities and the support activities of the private sector, have been limited.

Besides, water supply and sanitation are in most countries subjected to excessive fragmentation of responsibilities, with some overlap of jurisdictional powers between several of the numerous agencies involved.

Operation, maintenance and monitoring are often neglected in favour of new construction. Reliance on subsidies, dilution of accountability, lack of sound costing, pricing, and cost recovery policies, and lack of public awareness of the benefits of WSS, have resulted in inadequate user participation.

Many countries have yet to elaborate fundamental legislation and regulations required to cover matters pertaining to the preferential allocation of the best resource to domestic water supply, the use of wastewater for agricultural, industrial, or municipal purposes, water resource protection and conservation, and the recovery of costs from WSS users.

The issues to be addressed by the consultation can be defined as follows:

- the share of water resources which is allocated to community water supply should consist of water presenting the most favourable qualitative, quantitative and access conditions;
- regulations are required in the field of wastewater use especially in agriculture, with respect to public health and environmental protection;
- the regulations which govern the institutional framework of the water supply and sanitation sector should be reviewed to improve WSS management, and to ensure that community water supply and sanitation costs are recovered.

These issues are addressed in the following sections of the report.

REALLOCATION OF WATER RESOURCES
(Report of Commission I)

Introduction

The issue of allocation and reallocation of water resources is rapidly gaining importance. Because of flow limitations in and deterioration of streams, springs and groundwater aquifers, it has become imperative for governments to ensure proper regulation of water use and water rights. Efficient use of water and protection of the resource are indispensable, not only to protect valuable investments but also to avoid or postpone considerable expenditures on water treatment for domestic use. It is often less expensive to prevent the occurrence of pollution than to treat water to the standards required for drinking purposes, and it involves much lower health risks.

The legal systems controlling the ownership of water resources differ considerably throughout the world, but the trend is that either government declares all water to be its property, or it is vested with the right to control the use of water. In this way governments have the power to allocate or reallocate the right to use or reuse water. Wherever such powers do not rest with the government action should be taken.

The reallocation of water resources is increasingly required as a result of increase in domestic water use mainly due to population growth, in competition with other water uses such as those of agriculture, guaranteed by previous decisions or customary rights. Earlier allocations of water often have not taken into account the necessity to reserve the best quality water as the prime source for drinking.

Adequate legislation is a key instrument to ensure proper allocation of water resources and particularly to safeguard the rights of domestic users. The legislation should be implementable and enforceable: this is the prime responsibility of the government. However positive incentives, and active involvement and motivation of the community are often more effective than enforcement of laws through court orders.

Sound water resources planning and close involvement of the communities and the users are therefore important instruments to facilitate the implementation of legislation concerning water resources allocation and use. In many countries however these tools are still insufficient and need to be strengthened. Particularly when it comes to the allocation of financial resources, priority tends to shift to sectors which are likely to provide immediate revenues to governments.

Annex V contains a summary of comparative legislation on the reallocation of water resources.

Findings and Conclusions

Governments need to have the legal power to allocate and reallocate water use rights. Where that is not the situation urgent action is needed to create or strengthen that power.

In water resources allocation priority should be given to household consumption to satisfy the basic needs of the population. In some cases this minimum level could include provision of water to some livestock essential for the survival of the family. The law should include a statement giving priority to the use of water for household consumption. Other uses of water should not be subjected to inflexible rules as priorities change in time and space.

In the allocation and reallocation of water, customary and traditional water rights need to be taken into account as far as possible to facilitate the actual implementation of the law. Of particular importance is the allocation or reallocation of the highest quality water for drinking water purposes. This is to avoid the risk associated with failures in treatment of heavily polluted river or groundwater. Such failures are likely to occur in countries where the operation and maintenance of WSS systems are unreliable, as a result of lack of strong leadership and adequate resources, or inappropriate methods, procedures or technology.

In case priority allocation of water for domestic consumption is in conflict with existing - including customary - rights for other uses, the water resources administration should be empowered to:

- (i) modify the existing rights, or
- (ii) condemn such rights.

Compensation may be required in cash or in kind (i.e. water) according to existing legislation.

A pre-requisite for the proper allocation or reallocation of scarce water resources and their sound management, is the existence within the structure of the government of a water rights administration. This governmental Unit should be responsible for granting water use and wastewater discharge permits, and monitoring and controlling the exercise of such permits. In addition, it should be responsible for the creation of a centralized data base of available water and existing rights of use, and for collection of water use and wastewater disposal charges. In many countries there is a need to set up or strengthen such an administration.

Integrated planning of water resources is essential and the establishment of the plan should be made obligatory in the law to serve as a framework for basic principles involved in water resources management, including priority allocation of drinking water, community involvement and the satisfaction of minimum needs.

Support to establish water utilization plans could be provided as a joint effort of several external support agencies. It seems most effective to establish regional or even subregional plans as an input to more general planning. The water resources plans should include allocation of other resources such as funds, staff and equipment. The legislation should allow and specify for adequate community/user involvement including the provision of authority to users' associations to plan, implement and manage their water supply systems. For large systems, the interests of users' associations could be consolidated in the form of a federation of water users associations.

Mechanisms for community involvement appear particularly feasible at local and intermediate levels. At national level the interests of the users need to be protected through representative bodies such as national water committees or other water management bodies. The advantages of adequate users' involvement need to be stressed in the legislation or otherwise, as this participation of the population constitutes a key element to ensure the sustainability of water systems; community involvement also prevents social conflicts or facilitates their solution. Regulations are often phrased in complex terms which should be simplified and clarified in order to ensure that they can be understood by those concerned with their implementation.

In order to avoid or reduce qualitative and quantitative problems with drinking water supply resources, provisions for the protection of catchment areas should be included in the legislation. For large catchment areas government agencies or water institutions could undertake the control. They should therefore have a legal right to do so. For small catchment areas such control could be entrusted with the users provided they have appropriate instruments and training, as well as the support of the law.

The government administration for water resources management should, in cooperation with the Public Health authorities, exercise its responsibility for the control of compliance by the water supply institution with all existing legislation concerning the provision of water supply services. Simple techniques for sanitary inspection of water supplies should be adopted. For the purpose of controlling water pollution, the establishment of effluent standards should be encouraged and ways should be found to enhance compliance and to establish control mechanisms. These should be financed from charges to be paid by the polluting entities. Enhanced public awareness is required to facilitate the protection of water resources.

Recommendations

The following actions were recommended by the Commission:

- preparation of a report* comprising the abstracts of representative laws and regulations concerning key elements of legislation (allocation, users' involvement, protection of sources, mechanisms for compliance, etc.) in different legal and cultural settings;
- preparation of a comparative study of legal mechanisms for the reallocation of water resources to priority uses with special regard to the use of water for domestic consumption;
- preparation of a comparative study of legislation governing the provision of water supply and sewerage services to the public;
- assistance to developing countries:
 - . to draft appropriate legislation concerning, inter alia, procedures for the allocation and reallocation of water resources, priority of household consumption, adequate planning, users' involvement, and protection of water sources.
 - . to set up an effective water rights administration with the main function of creating a centralized record of water users, and administering a permit system for water use and wastewater discharge, and with authority to monitor wastewater uses and discharges;
 - . to promote the establishment of integrated water resources planning at all appropriate levels; external support agencies should cooperate to identify possible ways to achieve this objective;
 - . to enhance the capacity of water agencies and users' associations to manage their water systems by establishing simple tools for monitoring water catchment areas; in the case of rural areas and of systems operated by the users the need for chemical and bacteriological analysis should be minimized.

* A general documentation is provided by a United Nations publication entitled "Abstraction and Use of Water: A Comparison of Legal Regimes" (New York, 1975) and by the important series of FAO publications on water rights in various regions.

LEGAL REGIMES FOR WASTEWATER USE
(Report of Commission II)

Introduction

"Wastewater" is the product of a chain of events, in the public and private sectors, which should in themselves be carefully evaluated as part of a comprehensive programme to minimize water pollution and optimize water consumption. Once it has been generated, wastewater should be seen as a resource which often represents a value to the national economy. As such, it should be allocated as part of a rational plan for maximizing the social benefits of limited water quantities. Governments should make a conscious effort to articulate the legal status of wastewater and delineate a legal regime for its use. This legal regime should incorporate specific measures to protect public health and the environment from the potential adverse effects of wastewater use.

Findings and Conclusions

The following findings and conclusions have been arrived at having in view wastewater as a resource of economic value:

1. Governments should control the allocation of raw wastewater and the use of treated wastewater with a view to:
 - (a) securing tenure for the user, and
 - (b) ensuring adequate and reasonable protection of public health and the environment.
2. When water is abstracted from a system and waste is generated as a result of use and treated for subsequent reuse a net loss to the water system occurs as a consequence of return flows not reaching the system. As a result the rights of legitimate users of system water who rely on such return flows may be impinged upon. Under these circumstances the rights of such users need to be protected.
3. To be effective, any legal regime should delineate appropriate measures to facilitate compliance with regulatory provisions, including financial incentives and the sanction of individual criminal responsibility.
4. In devising legislation for wastewater management, care should be taken to ensure consistency with overall sound water resources management legislation, including in particular water pollution control legislation.

5. If raw wastewater is supplied by a centrally operated sewerage system, the legislation for the management of wastewater should reflect the operational requirements of the sewerage system as this provides the raw material for the production of wastewater. Special attention should be given, in particular, to (a) ensuring that individual dischargers of domestic wastewater connect to the sewerage system as a matter of duty, and (b) carefully controlling non-domestic discharges and relevant connections to the system. Such operational concerns should be fully responded to by the legislation governing the provision of water supply and sewerage services to the public. In this case, wastewater management legislation must ensure that its provisions are coordinated with the provisions of the water supply and sewerage legislation.

6. Because legislation for wastewater management consists of a water management component and a public and environmental health component, different branches of government may be involved in its administration. As a result, there is a need for careful coordination among the various government institutions involved. Also, those who design, build, and run wastewater projects should not be responsible for the administration and enforcement of the relevant legislation: there should be a separation of authority between those who design, build, and run wastewater projects and the government agencies responsible for delivering relevant permits and for checking compliance and enforcing the law.

7. Since wastewater is a resource having an economic value, user charges are justified and, where feasible, desirable to encourage the rational use of the resource.

8. In situations where additional costs are incurred for wastewater use, some legal framework for appropriate cost allocation is essential.

Recommendations

1. Any delineation of a legal regime for wastewater management should address the following:

- (a) a definition of what is intended as wastewater;
- (b) the ownership of wastewater;
- (c) a system of licencing of wastewater use;
- (d) protection of other users of system water adversely affected by the loss of return flows into the system resulting from the use of wastewater;

- (e) restrictions for the protection of public and environmental health with respect to:
 - (i) intended use of the wastewater,
 - (ii) treatment conditions and final quality of wastewater,
 - (iii) conditions for the siting of wastewater treatment facilities;
- (f) cost allocation and pricing;
- (g) enforcement mechanisms;
- (h) disposal of the sludges which result from wastewater treatment processes;
- (i) institutional arrangements for the administration of relevant legislation;
- (j) the interface of this legal regime with the general legal regime for the management of water resources, including in particular the legislation for water and environmental pollution control, and the legislation governing the provision of water supply and sewerage services to the public, including the relevant responsible institutions.

2. Comparative studies of various legal regimes in force for the management of wastewater should be carried out to determine the present state of development of relevant legislation, and what is working and what is not working in such legislation. These studies should take into full account the legal and institutional framework for the management of water resources, for the control of water and environmental pollution, and for the provision of water supply and sewerage services to the public. These comparative studies should lead to the development of criteria for evaluating the effectiveness of various legal regimes, and of guidelines for the drafting of legislation on wastewater management.

3. An evaluation should be made of the potential for providing technical assistance to countries in drafting legislation relating to wastewater management, including an approach to potential donors.

4. FAO and WHO should intensify their commitment to this area and should allocate the resources required to carry out these recommendations.

5. Cost/benefit (long range) analyses associated with the implementation and enforcement of a legal regime for wastewater management should be carried out with a view to enhancing the level of political, financial, and manpower commitment to the implementation and enforcement of relevant legislation.

**INSTITUTIONAL AND LEGAL ISSUES
IN WSS MANAGEMENT
(Report of Commission III)**

Introduction

One of the essential conclusions of the WHO Working Group on Cost Recovery is that sustainability is the most desirable development status of any WSS system. The Working Group has provided guidance for WSS institutions to achieve this objective, in a "Water Supply and Sanitation Handbook of Financial Principles and Methods" (document WHO/CWS/90.10, WHO, Geneva, 1990). The Commission has generally endorsed the recommendations of the Handbook, and provided specific suggestions with regard to improvements in financial performance, more rational sector planning and project appraisal methods, and assessment of the potential role of the private sector in WSS.

Annex VII contains a regional overview of efficiency and equity conditions in WSS.

Findings and Conclusions

The issue of enforcement and collection of charges for water supply and wastewater disposal services is becoming critical in many developing countries, and is being currently addressed by their governments in order to improve the performance of sector institutions. Lack of economic data and inadequate tariffs and cost recovery procedures affect the financial capabilities of WSS organizations. These agencies must rely on government subsidies, or lower the standards and levels of coverage of the services provided, rather than apply demand management procedures required to optimize the use of scarce water resources. Wastewater collection and disposal charges and penalties to prevent environmental pollution are seldom assessed and enforced.

In addition, there are cases of legally valid private water abstractions which have the collective effect of diminishing the critical mass of financial resources needed for the adequate operation of drinking water supply and sanitation services.

With regard to planning, the drinking water supply and sanitation sector suffers from a general inability to translate policy priorities into operative actions and plans; to ensure and safeguard the viability and sustainability of programmes and projects; to assess the different alternatives for the satisfaction of drinking water supply and sanitation needs (including monitoring of unaccounted-for and unpaid-for water); and to critically assess water supply and sanitation standards commensurate to the problems, needs and resources of the systems and the populations which they serve.

In many developing countries, the public sector is faced with serious financial constraints which require the identification of new alternatives for the mobilization of resources. Drinking water supply and sanitation is a public monopoly in many countries. This preempts and eliminates alternative institutional arrangements for resources mobilization, while there is an urgent need for considerable increase of human, financial and technological resources to improve the coverage of WSS services in most developing countries.

Recommendations

With respect to the enforcement and collection of WSS charges, the Commission recommends that whenever possible water be charged at a level which should be sufficient to cover all economic costs, so as to ensure that the consumers will receive the price signals which will enable them to choose to increase or decrease consumption in the best interest of the economy as a whole. This requires that water charges be based on metered volumes of consumption. The pros and cons of metering should therefore be assessed in the case of each system. Due allowance should be made for "lifeline" consumptions, and tariffs should be gradually increased for consumptions beyond the threshold of basic needs, in order to ensure the overall financial equilibrium of the agency in charge of the service.

The system of water charges should be enforced universally, eliminating class exemptions for privileged categories of users, and allowing variances to the rule of universal payment only for individual cases of proven economic hardship. This principle of full and universal cost recovery is however not to be used to compensate for inefficient water management and monitoring, resulting in poor technical performance evidenced by very high levels of unaccounted for water or other losses; a maximum level of physical loss should be allowed, beyond which it is advisable to improve the supply, rather than unduly penalize the user.

The billing and collection system should be organized to assure liquidity maintenance throughout each budgetary period. Charges for water uses should include pollution related assessments based on the volumes and nature of polluting substances and the cost of treating them.

The legal owners of facilities for private water abstraction can be taxed and assessed either for the use of water, or for the performance of the activity requiring water. However, in so doing governments should carefully assess and balance the private and public costs and benefits resulting from across the board taxation of activities, including legally valid private water supplies.

In some cases (conflicts for the same supply source, impairment of water quality, damage to public health), the beneficiaries of legally valid private rights to abstract water might be compelled to discontinue their activities. However, governments should be aware that these kinds of measures should be reasonable according to available data and existing interests; in some cases the discontinuation of a valid water right might entitle the beneficiaries to some form of compensation.

Defaults in payments should allow the water distribution agency to:

- (a) cut off the supplies;
- (b) collect the amounts in arrears.

Collection of arrears should be handled summarily, and operational mechanisms should be devised for this purpose, for instance granting power of attorney to private collection firms.

An unpaid charge should be considered a charge "propter rem" and a lien against the property where the services were delivered, and no change in ownership can take place or be recorded without due and total settlement of the unpaid charges, including fines, punitive interests and any adjustment for inflation.

The Commission further recommended that guidelines on water tariffs, individual assessment and collection of charges be prepared with the assistance of external support agencies with specialized personnel, taking into consideration existing principles of comparative law, and accepted criteria for taxation according to the existing legislation. A simple mechanism should also be devised for the identification, assessment, processing and collection of water related charges, as a model for operational implementation of water related rates, taxes and charges.

With respect to planning, the Commission recommends that guidelines and procedures be drafted for the assessment of the appropriateness, viability and sustainability of drinking water supply and sanitation programmes and projects; compliance should be made mandatory for public and private undertakings. Financial institutions and water planning and budget authorities and organizations should endorse the proposed guidelines, which gradually enhance the sustainability of drinking water and sanitation systems.

The factors to be considered before the budgetary approval of drinking water supply and sanitation programmes and projects include, inter alia:

- availability of adequate water supplies (quantity and quality) over the expected life of the programme;
- balanced development of water supply and sanitation improvements;

- observance of multi-purpose water planning principles when designing water projects;
- assessment of alternative technologies;
- design of water supply and sanitation projects on the basis of effective demand, unless a different approach is taken in the light of explicit socio-economic considerations;
- opportunity for informed public participation;
- assessment of the environmental, social and economic impact of the proposals;
- assessment of the availability of financial, human and institutional resources to ensure the sustainability of the programme;
- optimization of the use of all resources.

The guidelines, and the documentation relevant to the specific programmes and projects, should be made available to the public.

With respect to institutional improvements, the Commission recommends that governments, UN agencies, NGOs, research institutions and other technical and financial organizations investigate the possibility of mobilizing the private sector in providing water related services. This assessment should include different alternatives for participation, for instance the subcontracting of engineering studies, the concession of water works and services, and the transfer of ownership of facilities. An enhanced role should be considered for the private sector, including commercial organizations, users associations or cooperatives, and individual investors. Governments should endeavour to reduce the legal constraints affecting the participation of the private sector, and adequate consideration should be given to the factors or elements prompting this participation (for instance security of water rights, service rights and revenues).

Consideration should be given to the legal mechanisms to be used to monitor and control private sector activities.

The Commission further recommends that external support agencies cooperate with governments to review comparative experiences of private sector participation and prepare a state of the art report for future consideration. This report should include an exhaustive identification of the economic, financial, legal, institutional, social and technical issues to be assessed when considering the privatization of already existing public services. It should also assess the relative advantages and disadvantages of gradually increasing the role of the private sector, as opposed to a one-time transfer of all existing public WSS services.

LEGAL ISSUES

IN

WATER RESOURCES ALLOCATION

WASTEWATER USE AND

WATER SUPPLY MANAGEMENT

ANNEXES

ANNEX I

FAO/WHO CONSULTATION ON
LEGAL ISSUES
IN WATER SUPPLY AND
WASTEWATER MANAGEMENT

I. A. COMPOSITION OF COMMISSIONS

COMMISSION I. Reallocation of Water Resources

Dr D.	CAPONERA	WHO Consultant
Mr E.	DORING	GTZ, Germany
Mr B.	N'DEURBELAOU	Switzerland
Ms T.	SANTAMARIA	France
Mr S.N.	SHARMA	Nepal
Mr J.T.	VISSCHER	IRC, Rapporteur

COMMISSION II. Legal Regimes for Wastewater Use

Mr S.	BURCHI	Development Law Service, FAO
Ms M.	CARDOSO DA SILVA	Portugal
Mr K.	PODLASKI	Poland
Dr S.	SHUBBER	WHO/LEG
Mr H.	SHUVAL	Israel
Mr S.	TAMPLIN	WHO/WPRO, Rapporteur

COMMISSION III. Institutional and Legal Framework

Mr Y.	GLEMAREC	Collaborative Council
Mr J.P.	LAU-HANSEN	WHO/HLE
Mr J.	ROXO PIRES	Portugal
Mr M.	SOLANES	UN/DTCO, Rapporteur

ANNEX I.

**WORKING GROUP ON LEGAL ISSUES
IN WATER SUPPLY AND WASTEWATER MANAGEMENT**

I. B. LIST OF MEMBERS

Dr D.	CAPONERA	Water Legislation Expert, WHO Consultant
Ms M.	CARDOSO DA SILVA	Manager, POR/82/005, WHO/UNDP, Portugal
Mr E.	DORING	Technical Adviser, GTZ, Germany
Mr P.	FAIVRE	Directeur aux Affaires Internationales, NAN C.I.E., France
Mr Y.	GLEMAREC	UNDP, Geneva
Mr J.	HUEB	Sanitary Engineer, WHO/CWS
Mr P.	KOENIG	Economist, WHO/CWS
Mr J.P.	LAU-HANSEN	Health Legislation Editor, WHO/HLE
Mr B.	LOCKE	Deputy to the Chairman, Collaborative Council, UNDP, Geneva
Mr A.H.	MAIGA	Sanitary Engineer, EIER Ouagadougou/EPFL Lausanne
Mr B.	N'DEURBELAOU	Sanitary Engineer, Hydrosult Development S.A., Lausanne
Mr K.	PODLASKI	Directeur, Water Management Department, Poland
Mr J.	ROXO PIRES	Sanitary Engineer, WHO/UNDP, POR/82/005, Portugal
Ms T.	SANTA MARIA	Legal Officer, Compagnie Générale des Eaux, France
Mr S.N.	SHARMA	Director General, Water Supply and Sewerage, Nepal
Dr S.	SHUBBER	Senior Legal Officer, Office of the Legal Counsel, WHO/LEG
Mr H.	SHUVAL	Director, Environmental Health, University of Jerusalem
Mr M.	SOLANES	Interregional Adviser Water Law, UN/DTCD
Mr S.	TAMPLIN	Regional Adviser on Environmental Health, WHO/WPRO
Mr I.T.	VISSCHER	Senior Programme Officer, IRC, The Hague, The Netherlands
Dr D.	WARNER	Manager CWS, WHO, Geneva

SECRETARIAT

Mr S.	BURCHI	Legal Officer, Development Law Service, FAO
Mr L.	LAUGERI	Technical Officer, WHO/CWS
Ms L.	MEYER	WHO/CWS, Secretary
Ms M.	NORTEY	WHO/CWS, Secretary
Ms F.	SIGALOTTI	WHO/CWS, Secretary
Ms A.	WATERS	WHO/CWS, Secretary

ANNEX II

FAO/WHO CONSULTATION ON
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**HEALTH GUIDELINES AND STANDARDS FOR WASTEWATER USE IN
AGRICULTURE: AN HISTORICAL PERSPECTIVE**

By Hillel P. I. Shuval

The late William Thompson Sedgewick, an early American pioneer in environmental health, taught his students that "Standards are often the best guess of one worker, easily seized upon, quoted and requoted until they assume the semblance of authority" (Levine, 1961). Sedgewick was a firm believer in constant review and revision of standards as more sound scientific and field evidence becomes available. This paper summarizes the scientific basis and historical and social forces that influenced the evolution of microbial standards and guidelines for wastewater use for agricultural purposes. (See also Shuval et al, 1986; The Engelberg Report, 1986; and WHO, 1989).

With growing urbanization, increased supplies of piped water and development of water carried sewerage systems, cities were faced with serious environmental and health problems associated with inadequate sewerage. The First Royal Commission on Sewage Disposal in England gave its official blessing to the practice of wastewater farming or land application in its report of 1865 which stated, "The right way to dispose of town sewage is to apply it continuously to the soil and it is by such application that the pollution of rivers can be avoided".

In the latter half of the nineteenth century, wastewater farming had strong official and public support. However, as the science of microbiology and hygiene developed, the fear of disease transmission by pathogenic bacteria of fecal origin grew and with it opposition to wastewater irrigation. In 1918, the State Health Department of California, was the first to draft modern regulations to control the public health aspects of waste water use. These were revised and made more strict in 1948. The officials of the California State Health Department who drafted the original strict microbial standard for unrestricted effluent irrigation of edible crops (2.2 coliforms/100 ml) were being pressed to come-up with a specific numerical standard which would ensure the health and safety of the public for all forms of wastewater irrigation including for unrestricted irrigation of vegetable crops normally eaten raw.

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On the one hand there was a high level of interest by the authorities searching for an appropriate disposal strategy in very arid areas as well as pressure from agricultural groups interested in establishing a legal basis for recycling of wastewater. On the other hand there were deep-seated fears and health concerns on the part of the medical community, public health officials and the public. The California standards apparently were based on the judgement that a microbial standard that is safe for drinking water would also be safe for agricultural irrigation. The majority of committee members adopted a "zero risk" approach, and felt safe in that no official could be accused of drafting too lax a standard.

Recent World Health Organization studies have shown that the mean coliform count of the rivers of Europe ranges between 1,000 - 10,000/100 ml. In 1973 the USEPA together with the American Academy of Sciences recommended the river water be considered safe for unrestricted agricultural irrigation if its mean coliform count did not exceed 1,000/100 ml. In historical perspective, it is clear now that the promulgators of the California standard never could have imagined that their regulations, drafted under a specific set of local conditions and social and political pressures, would become the almost universally accepted world standard for effluent used for unrestricted irrigation of vegetable crops. However, since they were the first standards in the United States and emanated from one of the most respected Departments of Health, by 1980 they had been copied and adopted by most of the States in the USA and numerous countries around the world.

The California standard meant that irrigation of vegetable crops eaten raw was not encouraged and could rarely be achieved even in the United States. In the arid developing countries the economic motivation of growing vegetables and salad crops normally eaten raw is high since waste water farms are usually near the large urban centres where the market for fresh vegetables is important and provides the greatest economic return. Government regulations forbidding growing vegetables with wastewater are difficult to enforce. WHO and the World Bank became concerned about this anomalous situation and sponsored studies to reevaluate the scientific basis for wastewater irrigation guidelines and standards. The Engelberg Report of 1986 summarized these findings and presented a radical departure from previous policy in the area of wastewater reuse guidelines and standards. On the other hand it provided a major liberalization of the earlier severe zero risk "California" bacterial guidelines which had evolved unwittingly into a worldwide accepted standard even though it was illogical and unfeasible from its inception. One of the important features of the new guidelines is that they are attainable in low cost systems under most conditions.

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An Overview of Water Source Problems

by J.T. Visscher

A recent IRC study report * provides an overview of water source problems on the basis of literature review and discussion with experts. The main causes for quantitative and qualitative problems in sources used for drinking water abstraction are effects of land use, deforestation/reforestation, wastewater disposal, waste disposal, natural disasters, competing demands from other sectors and poor utilization of water.

The IRC report also provides an overview of solutions which have been tried out and which include careful selection of water sources, land use control, reduction/prevention of uncontrolled waste/wastewater disposal and improving performance of water supply systems.

The implementation of legal measures for water source protection is facing considerable constraints. The legislation is often copied from other countries and not adapted to the specific local conditions. More importantly the awareness of cause and effect of water source problems is still low amongst governments and the public. They lack quantitative and qualitative information and often have other priorities. It is very clear that unless basic needs are fulfilled protection of water sources will not become a priority issue. A comprehensive approach will be required to enhance water source protection as a key component in environmental protection. A recent workshop hosted by the Italian government mapped out the key components of a strategy which is referred to as Primary Environmental Care (PEC). This strategy focuses primarily at empowering rural and urban communities to better cope with their environment and enhance sustainable development.

This strategy is particularly useful for users in the catchment area where they live, polluting/affecting their own water sources. In addition, there is a need for suitable legislation to be complied with particularly by the entities (industry, agriculture, forestry) with activities in exposed catchment areas, but not using the water themselves, thus having lower interest in protecting the catchment area in order to protect the water source. The enforcement of legislation requires incentives for the communities to effect control on their water sources, at a level which government agencies will often not be able to provide, even with strong increase in staff and adequate training.

* Lee and Bastemeyer (1990), Drinking Water Source Protection: Preliminary Review of Problems, Causes and Experience, IRC.

ANNEX IVFAO/WHO CONSULTATION ON
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WASTEWATER MANAGEMENTAlcanena Industrial and Domestic Wastewater
Treatment System

by M. Cardoso da Silva and J. Roxo Pires

The Alcanena sanitation system is located in the catchment of the Alviela river, a tributary of the Tejo. The company supplying water to Lisbon has a concession of 70.000m³/day dating from the 18th century. The Alviela catchment has no significant intensive agriculture. The main economic activity is industry, with a strong dominance of tanneries. Animal breeding, olive oil processing and activities associated with the textile industry are also present. The lack of adequate wastewater treatment is responsible for the degradation of the quality of the water bodies of the catchment.

Since 1981, severe oxygen depletion is consistently observed, creating anaerobic conditions along most of the river during the low flow periods. The poor water quality observed has resulted in a growing public concern, and in the political decision to establish a joint system to collect, treat and discharge industrial wastewaters and domestic sewage.

The wastewaters of approximately 130 tanneries, accounting for about 70% of the national production of finished leather, are collected and transported to a single activated sludge waste water treatment plant, by a set of three main sewers and three pretreatment plants.

The construction of the system was completed in 1987, at a cost of approximately 10 millions US dollars, totally funded by the central Government.

To prepare the future transfer of the system to the users, a protocol was signed by the industries, the municipality and the government, which sets rules covering operational, administrative and financial management:

- the users will take over full responsibility for the management of the system, by creating a "Users Association",
- the users will support the operation and maintenance costs of the system; after a transition phase, the central government share of these costs will gradually decrease,

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- the Portuguese Government financed the total investment; 50% of that cost will be reimbursable; the users will refund the principal over 20 years; the amortization will be raised as a specific tax to be paid together with all other contributions by the users of the system.

In spite of this protocol all the costs of operation and maintenance have been covered by the government. This situation is due, among others, to the following reasons:

- lack of regulatory measures to implement the "user pays principle" as established in the Basic Law for the Environment;
- delay in the publication of legislation on the "Association of Users of the Water Public Domain".

Recently, important legislation covering those matters has been published allowing the central administration to take a new attitude towards water resources management. As a result, several actions are now in progress to implement the agreement covered by the protocol, which can be synthesized as follows:

- the payment in the current year by the users of the system, of about 10% of the operation and maintenance costs; the significance of this contribution exceeds largely its absolute value, as it demonstrates the users' willingness to pay for the facility provided;
- constitution of the "Alcanena System Users Association", an entity which will manage the system on a commercial basis;
- optimum utilization of the facilities through efficient technical and financial management, until their transference to the "Alcanena System Users Association".

Despite some problems during the initial phase of the operation of the wastewater treatment plant, the system has already had a positive impact on the water quality of the receiving bodies, as shown by the latest monitoring data. The recent additional measures are expected to further enhance the quality of the Alviela catchment. These changes will create adequate conditions to ensure a sustainable development of the area.

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REALLOCATION OF WATER RESOURCES: COMPARATIVE LEGISLATION

By S. Burchi

The following analysis has been prepared by the Development Law Service of FAO, and presented in a document entitled "A Comparative Overview of Legislation on the Satisfaction of Domestic Water Needs as a Matter of Priority".

The use of water for domestic purposes is accorded priority status in the legislation in various ways, in connection with specific aspects of the management of the resource. Most notable among these are the administrative allocation of available water resources to competing uses, and planning for future allocations. In addition, mechanisms are provided by legislation to restrict interferences with established water resources allocation patterns, or to allow such interferences, in the interest of satisfying priority domestic water needs.

Domestic water use tends in the relevant legislation to encompass use for drinking, bathing, cooking, and watering of livestock. Occasionally, the watering of a small garden or orchard is also included. Nowadays, as the bulk of domestic water is provided by public utility concerns, the very notions of domestic use and domestic user tend to assume a broader connotation than in the past. The modern notion includes in fact the use of the resource by a bulk supplier for the provision of water to the general public for uses which are primarily, but not exclusively, domestic - especially in an urban context, where mains water is supplied for use by commercial and industrial establishments also.

The satisfaction of domestic, drinking, and household needs of populations has priority in the water laws of almost any country over the satisfaction of any other water need. Frequently domestic use is given priority, when associated with the provision of water to population centres under the broader "public water supply" use category 1/: it then also takes priority in the disposal of competing applications for water abstraction permits 2/, and in the satisfaction of established water rights in times of shortage of water 3/.

In response to conditions of near permanent water shortages, traditional Islamic Law has institutionalised the absolute priority of the right to take water to quench one's thirst and to water one's animals in the so-called Right of Thirst 4/. Under common law riparianism, still controlling in Australia, South Africa, and parts of the United States, riparian landowners have a privileged right to withdraw as much water as they need for domestic purposes, such as drinking, bathing, cooking, washing, and animal watering 5/. In South Africa, however, these privileged domestic rights are restricted to the normal, as opposed to surplus, stream flow 6/.

The same preference finds further expression in statutory or court requirements to the effect that water suppliers satisfy domestic needs first 7/ and to the effect that existing water abstraction rights or protected interests can be condemned by intervening domestic-public water supply uses 8/.

The priority destination of water supplies to domestic/public water supply use is ensured also through other legal mechanisms. Italian legislation authorises the reservation of designated water bodies for the purposes of the National Water Master Plan for Domestic and Municipal Water Supply 9/. Reserved water resources cannot be used for other purposes unless priority uses have been satisfied in full 10/. State water reserves may be established also under the legislation of Morocco for the conservation of public water supplies 11/. Under Canadian federal legislation, instead, water resources which have been reserved for specific uses may exceptionally be utilised to satisfy domestic needs, subject to an administrative permit 12/.

Limited to groundwater, Israeli legislation 13/ empowers water licensing authorities to deny a water abstraction permit if this interferes with an established domestic/municipal water abstraction. The interference need only be potential in Germany 14/. In similar fashion, a piece of French colonial legislation, still in force in a number of African countries, prohibits groundwater withdrawals from aquifers which are tapped for public water supply purposes 15/.

Under Tunisian legislation, industries exploiting water in excess of 300 cubic meters per day, of a quality suitable for human consumption or for agriculture, are under an obligation to show that water in the amount and of the quality needed for the industrial utilisation is not available at acceptable market conditions from alternative sources 16/.

In Peru, the supply of water for uses other than domestic is subject to being curtailed when it is needed to increase domestic supplies as a result of population growth 17/. In New Zealand, mining privileges are denied priority over the use by any person of a reasonable quantity of water for domestic purposes 18/. Under the California Water Code, the use of potable domestic water for the irrigation of greenbelt areas is forbidden when reclaimed wastewater is available 19/.

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In some countries, the use of drinking water for purposes other than domestic use may be restricted when the water is needed to satisfy vital needs. Kerala (India) water legislation restricts the non-domestic use of domestic water supplies to exceptional circumstances as determined by law 20/. Water pricing mechanisms designed to penalise the use of high-quality water - most notably, groundwater - for non-domestic purposes - most notably, by industries - are employed in Hungary and Czechoslovakia 21/.

Measures are also taken by the legislation of some countries to ensure and facilitate access to sufficient quantities of water to satisfy primary needs. In Tunisia, for instance, water may be transferred from a basin to another to satisfy the domestic needs of the population of the receiving area, provided that the needs of the area of origin have been satisfied, and no other more economic solution is available. Water transfers may also be effected to provide water for agricultural and industrial activities, but only on condition that the primary needs of the area of origin have been fully satisfied 22/.

Under the Peruvian Water Act, zones or points of free access to natural or artificial water sources may be established where a drinking water supply system does not exist 23/. In Colombia, persons may be authorised to abstract groundwater to satisfy their own domestic needs from a neighbour's land, and to establish a servitude for this purpose, if groundwater is not available in their own holding at a reasonable depth.

FOOTNOTES

- (1) E.g. In Latin American countries, see J. Lopez, El Derecho y la Administración de Aguas en Iberoamerica, in proceedings of the International Conference on Global Water Law Systems held in Valencia, Spain (1975).
- (2) A hierarchy among water uses provides guidance in the disposal of applications for water use rights under the legislation of, among others, Western states of the United States, Iran, Jamaica, Spain, Bolivia, Chile, and provinces of Argentina (such as Corrientes, Jujui, La Rioja, Mendoza).
- (3) An order of priority satisfaction of water needs in times of water shortage is provided by the legislation of Israel, Philippines, Kenya and Morocco (limited, however, in the last three countries, to domestic as opposed to all other uses of water).
- (4) Food and Agriculture Organization of the United Nations (FAO), Water Laws in Moslem Countries, Irrigation and Drainage Paper N. 20/1 (1973), p. 13.
- (5) The preference for natural uses had its origin in a dictum from Evans v. Merriweather, 4 Ill. (3 Scam.) 49, (1842). See also City of Canton v. Shock, 66 Ohio St. 19, 63 N.E. (1902).

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- (6) South Africa, Act N. 54 of 1956 (Water Act), Para.9, Statutes of the Republic of South Africa 1201 (1970). Surplus flow includes any water that cannot be used without storage; normal flow includes visible and flowing water with a permanent source, such as a spring, seepage or steady melt-water, which can be used directly without the aid of storage on riparian land (South Africa, Act N.8 of 1912, Irrigation and Conservation of Waters Act), para. 10, Statutes of the Union of South Africa 30 (1912); South Africa, Water Act, Para.1 (xi, xix).
- (7) As in Victoria (Australia), Act N. 6413 of 1958 (Water Act), Para. 186, Victoria Statutes 1958, p. 749; Tanganyika Waterworks Rules, Sec. 9(1), Tanganyika Revised Laws ch. 281 (1963); Iraq, Law N. 136 of 1964 concerning the Baghdad Water Supply Administration, Art. 2; Kenya, Laws of Kenya chapter 372, Para. 142 (1962).
- (8) As in West Germany, Government of the Federal Republic of Germany, Instruments juridiques visant à une utilisation rationnelle de l'eau en République Fédérale d'Allemagne et expériences faites lors de l'application de ces lois 5, UN Doc. WATER/SEM.6/R34 (1979); Turkey, Law N. 7428 of 1960 on Village Drinking Water, Art. 12, 15; and Western States of the United States, such as Colorado and Wyoming.
- (9) Italy, Presidential Decree N. 1090 of 11 March 1968.
- (10) Id., Art 6(3), 10.
- (11) Morocco, Dahir of 1 August 1925, Art. 17.18.
- (12) Canada, Water Act 1960, Sec. 45(6) and 88.
- (13) Israel, Law N. 5715 of 30 May 1955 (Water Drillings Control Law) Art. 5, as amended by Law N. 5722 of 16 January 1962.
- (14) Government of the Federal Republic of Germany, Administrative Control System for Rational Water Utilisation 3,4 UN Doc. WATER/SEM.6/R.52 (1979).
- (15) France, Order N. 9929 of 15 December 1955 of the Ministry of Public Works (quoted in FAO, Water Laws in Moslem Countries, Irrigation and Drainage Paper N. 20/2 (1978), 310.
- (16) Tunisia, Law N. 75-16 of 31 March 1975 (Water Code).
- (17) Peru, Decree N. 261-69-AP, Regulation of Titles I, II and III of Decree-Law N. 17752 "General Water Act", Art. 104, 105.
- (18) New Zealand, Water and Soil Conservation Amendment Act 1971, Sec.16.
- (19) California, Water Code, Sec. 13550, (West, Supp. 1984).
- (20) Ordinance N. 102 of december 3, 1984 (Kerala Water and Wastewater Ordinance), Sec. 40.
- (21) R. Johnson, G. Brown Jr., Cleaning up Europe's Waters, p. 42 (1976); Government of Hungary, Development of Water Management Supervision to Improve the Efficiency of the Work of the Water Authority, 3, UN Doc. WATER/SEM.6/R.41, 1979.
- (22) Tunisia, see note 16 supra, Art.88.
- (23) Peru, Decree Law N. 17752 (General Water Act), Art. 39.
- (24) Colombia, Decree N. 2811 of 18 December 1974, Code of Renewable Natural Resources and Environmental Protection, Art. 151.

ANNEX VIFAO/WHO/CONSULTATION ON
LEGAL ISSUES
IN WATER SUPPLY AND
WASTEWATER MANAGEMENTLEGAL REGIMES FOR WASTEWATER USE
COMPARATIVE LEGISLATION

By S. Burchi

The following analysis has been prepared by the Development Law Service of FAO, and presented in a document entitled "Legal and Institutional Aspects of Wastewater Reuse".

The water and sanitation legislation of developing as well as developed countries can be expected to reflect a growing concern for water scarcity. A water crisis is looming large in the not too distant future if the fast-growing demand for water as a result of population growth, intense use of water-consuming technologies and processes particularly in the manufacturing industries, and inefficient use of water particularly in the public water supply and irrigation sectors, is not met by a comparable growth in the supply, or brought under control. As a result, the use of wastewater is gaining recognition as a means for augmenting the available supplies of water, thereby easing the supply/demand imbalance by acting on the supply side of it.

In the more water-scarce areas of the world, wastewater use - particularly in agriculture - has a long history sometimes dating back centuries. In modern times, the practice of using wastewater has developed in connection with the prevention of pollution of surface and underground waters, and to improve agricultural production through the conservation of the nutrients contained in the wastewater itself 1/. In dense agglomerations with high water consumption, sewerage is sometimes the most appropriate technology, and the use of wastewater can contribute to reducing its high cost. In addition, depending on the circumstances, treatment of wastewater for subsequent use may be cheaper than obtaining water from alternative sources of supply.

The following examples are intended as contributions to an understanding of the legal and institutional dimensions of wastewater use, with particular emphasis on the use of wastewater in agriculture. To this end, available legislation from different countries on this particular subject is presented, followed by identification of the underlying issues, description of approaches adopted to address such issues, and preliminary conclusions.

ALGERIA

In Algeria, wastewaters are classified as non-conventional water resources 2/. After treatment, wastewaters may be used both for certain industrial purposes and for the irrigation of certain agricultural crops. The use of wastewaters for the irrigation of vegetables to be eaten raw is strictly forbidden. The irrigation of other crops is subject to an administrative authorization 3/.

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BELGIUM

Under Wallonian regional legislation, the Government may require that raw sewage be given over to licensed wastewater treatment concerns, for subsequent use for cultivation purposes. Regulations are to spell out the terms and conditions of use of the resulting wastewater 4/.

ISRAEL

In 1956, wastewater use was established as a matter of national policy within the framework of the First National Water Plan. Subsequently, the Water Law of 1959 provided the legal mechanisms for the implementation of this policy by nationalizing all water resources, including wastewater effluents from municipal and industrial sources. As a result, the production, supply, and consumption of all waters, including wastewater, is subject to Government control in the form of administrative permits 5/. The Health Minister has authority to regulate the treatment of sewage, from a public health standpoint, for subsequent use for irrigation and other commercial purposes 6/.

MAURITANIA

The use of wastewater for irrigation purposes is subject to an administrative authorization, on condition that wastewater has undergone appropriate treatment in compliance with the regulations to be made concerning measures to prevent water pollution 7/. However, uses of wastewater in quantities not exceeding 5 cubic meters per hour are subject to a simple declaration 8/. All holders of irrigation use rights - including the holders of wastewater use rights - must avoid any waste of water, and make sure that the water they use does not become a vector of diseases, and does not cause any damage to neighbouring properties 9/.

Industries are under a statutory obligation to recycle their wastewaters in accordance with regulations to be made, and taking into account technical and socio-economic considerations 10/.

MEXICO

Wastewater use is regulated by the water resources legislation, and by the legislation on the protection of the environment. Effluents resulting from the use of water have the status of national property on a par with natural waters 11/ and, as a result, their utilization is subject to an administrative authorization, concession or permit from the Federal Secretariat of Agriculture and Water Resources 12/. The exploitation and use of wastewater are further subject to environmental standards and specifications to be laid down by the Federal Secretariat of Urban Development and the Environment. In the framing of such standards and specifications the health implications must be investigated in consultation with the responsible health authorities 13/.

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Urban sewage may be used in industry and agriculture provided that it undergoes treatment in accordance with the standards and specifications above-mentioned. Pending the adoption of such standards, the Government is directed by law to take steps with a view to promoting the treatment of wastewater used in agriculture, the cultivation of crops on a selective basis, and improved irrigation techniques 14/.

Regulatory and financial mechanisms are available to encourage the use of wastewater. In particular, the recycling and use of wastewater may be entered as a condition of the instrument of the grant of an administrative concession for an industrial water use 15/. Also, users of wastewater benefit from a seventy-five percent abatement of the water charges otherwise payable 16/.

PERU

In Peru, all waters, including wastewaters, are State property, and wastewater use is subject to a licence 17/. Pursuant to the wastewater use regulations in effect, licences for the use of wastewater for irrigation purposes may be obtained from the Ministry of Agriculture subject to the prior authorization of the health authorities 18/. This authorization does not entail the approval of the technical aspects of irrigation projects, which falls within the sphere of competence of other Government bodies 19/. The application for the authorization, which must be preceded by the payment of charges determined on the basis of the requested quantity of water, must contain :

- request addressed to the Minister of Health;
- technical studies justifying the project;
- detailed plans of the area to be irrigated;
- plans of the wastewater collection system;
- detailed plans of the wastewater treatment system, when necessary, in relation to the kinds of crops to be irrigated;
- report on the vegetable crops to be irrigated;
- evidence of payment of the prescribed charges 20/.

Following the necessary studies, the health authority may grant the authorization, and it retains responsibility for monitoring the effectiveness of the prescribed treatment plants 21/. The Regulations list the crops which may be irrigated with raw or treated wastewater. Agricultural products to be consumed raw are explicitly excluded from that list 22/.

All fields irrigated with wastewater must be identified with signposts. Those irrigated with untreated wastewater may not be located at a distance of less than 500 meters from population centers. When in the area where irrigation should take place there are wells which may be contaminated, the authorization of the health authority must be preceded by studies demonstrating the feasibility of the irrigation project vis-à-vis the legitimate interests of the well water users and the public health. An authorization by the health authorities is also required for digging a well to supply water for human consumption in a wastewater irrigation area 23/.

ANNEX VI

The use of wastewater for irrigation purposes without prior health authorization, and the failure to comply with the requirements prescribed by the health authorities, are punished with a fine. Repeated violations entail a criminal sanction, and the obligation to make good any damage or impairment caused 24/.

PHILIPPINES

In the Philippines, the National Water Resources Council is the government agency responsible for the utilization, exploitation, development, conservation and protection of the nation's water resources 25/. Water rights are granted by way of administrative permits, subject to conditions of beneficial use, adequate standards of design and construction, and any other term and condition that the Council may deem necessary to impose, in relation to the different purposes of water use 26/. Wastewater use is also subject, by implication, to such regime.

When the use of wastewater is feasible, it must be limited to the extent possible to uses other than direct human consumption. No person or agency is allowed to distribute wastewater for human consumption until it is demonstrated that such consumption will not adversely affect the health and safety of the public 27/. When the use of wastewater for human consumption is contemplated, applications for a water permit for domestic purposes must be accompanied by the clearance of the Department of Health, which must also lay down the terms and conditions of this use 28/.

SPAIN

The direct use of wastewater is subject to an administrative concession whether the wastewater is reused by the original abstractor prior to being abandoned, or by a third party 29/. In the former case, if the concession, under which water is abstracted and used does not provide for wastewater use by the concessionaire, a simple amendment must be entered in the original instrument of the concession. However, public notice must be given of the proposed change, and a favourable report obtained from the health authorities 30/. If a person or concern other than the original concessionaire intends to use wastewater, a separate concession must be obtained from the authorities in charge of granting all water abstraction and use rights, subject to prior health clearance 31/. In either case, a wastewater use concession is issued subject to terms and conditions as to the required level of treatment, water quality, and permitted uses 32/.

The use of treated wastewater for human consumption is forbidden. Such use may however be authorized by the River Basin Authority concerned, on a temporary basis and subject to restrictions imposed by the health authorities, when natural disasters occur or under other emergency circumstances 33/.

As reflected in the law in force, it is government policy to encourage wastewater use through financial incentives. The implementation of this policy, however, is left to regulations yet to be made 34/.

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TUNISIA

The use of wastewater in agriculture is subject to an authorization of the Minister of Agriculture after consultation with the Minister of Public Health, provided wastewater has undergone appropriate treatment. Wastewater used for irrigation purposes must have such characteristics as to avoid the spreading of diseases or damages to neighbouring properties. Under no circumstances may wastewater, even if treated, be used for the irrigation of crops to be eaten raw 35/.

Industries are to recycle their own wastewater every time this is technically and economically feasible 36/. The State may provide financial and, if possible, technical assistance for the installation of wastewater treatment facilities. Conditions for the control of such facilities are set forth in the agreement between the State and the beneficiaries of Government aid 37/.

UNITED STATES OF AMERICA

The reuse of wastewater is encouraged at both Federal and State levels. At Federal level, the US Environment Protection Agency (USEPA) administers the federal share of grants for funding wastewater treatment projects, for introducing methods of water reclamation and recycling, as well as for research & development projects, provided for by the federal water pollution control legislation 38/. The Bureau of Reclamation studies the various possible uses of reclaimed wastewater, and administers the loans provided under the 1956 Small Reclamation Projects Act for water reclamation projects 39/. At State level, studies are carried out on the potential uses, and effects on the environment, of reclaimed wastewater, and funding is provided in aid of research activities and new projects.

U.S.A.: CALIFORNIA

Regulatory environment

In California, the Department of Water Resources (DWR) is responsible for carrying out studies on the environmental impact of the various uses of treated wastewater. It also contributes to the funding of research projects, and to the identification and formulation of new projects.

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB) are in charge of the control and protection of water quality, and the administration of water rights. The SWRCB also administers the Federal and State Clean Water Grant Programme, which provides financial assistance to local public agencies for the construction of wastewater treatment, distribution and disposal facilities. The Office of Water Recycling, which operates within the SWRCB, promotes and coordinates wastewater reclamation and use practices 40/.

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Wastewater reclamation projects must obtain a permit from the RWQCB concerned, subject to prior screening by the Department of Health Services (DOHS) for compliance of the proposed project with DOHS regulations for the safe and direct use of reclaimed wastewater for irrigation and other uses 41/. The purpose of such regulations is to set acceptable levels of constituents of reclaimed wastewater in order to avoid health hazards in relation to the following uses: irrigation of food crops; irrigation of fodder, fiber and seed crops and pasture for milking animals; landscape irrigation; recreational impoundments; possibilities of recharge of aquifers for domestic water supply purposes 42/. The required level of treatment increases as the likelihood of human exposure to the wastewater increases. Other methods of treatment may be accepted if the applicant demonstrates to the satisfaction of DOHS that these will ensure an equal degree of reliability. The regulations also provide for the surveillance and control of wastewater treatment facilities, distribution systems, and use areas 43/.

In addition to screening wastewater reclamation projects, DOHS is also responsible for monitoring their performance. In the case of contamination due to the use of reclaimed wastewater, DOHS and the local health agencies have the authority to order its abatement and to issue peremptory orders 44/. DOHS also has cross-connection control regulations governing the wastewater delivery systems, aimed at maintaining a strict separation between reclaimed wastewater and domestic systems 45/. Local health agencies are independent and may, when they deem it necessary, impose more stringent requirements 46/.

Use rights involved in wastewater use practices

The owners of treatment facilities are held by California law to have an exclusive right to the treated wastewater as against any raw wastewater supplier, including those who obtain water by way of a water service contract, unless otherwise provided by agreement. However, the same wastewater treatment facility owners are unsure of their rights vis-à-vis other lawful water users as a result of the peculiar permit system of water rights in effect in the State 47/.

In fact, according to the State Water Code the owners of treatment facilities are not required to apply for an appropriation permit before diverting the return flow for reclamation. All they need to do is to obtain approval of a change in the point of discharge, place of use or purpose of use of treated wastewater. The SWRCB reviews the proposed changes, and may reject them if it deems that another lawful right holder would be injured by such use 48/. The implication is that since an appropriation permit is not required for a reclamation use no priority is attached to these uses vis-à-vis other appropriation use rights 49/.

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Finally, if a reclaimed wastewater supplier and an established freshwater supplier operate in the same district, the latter is entitled to receive compensation from the former for loss of revenue. In practice, conflicts are prevented through mutual agreement, whereby the freshwater supplier is granted full control over pricing in the district, while the reclaimed wastewater supplier keeps control over the water he supplies 50/.

ZIMBABWE

In Zimbabwe, water used for electrical, mining or miscellaneous purposes is allowed to return to the body of water from which it was abstracted subject to the conditions imposed on the grant of use. A person wishing to use any water during the course of its return, may file an application to the Water Court for the right of use. The Water Court may grant the right subject to the conditions it may deem necessary to impose 51/.

According to the public health regulations in force, the use of effluents for irrigation purposes, without the prior approval of the competent health authority, is prohibited. Approval may be granted under the condition, when necessary, that the channelling and supply system for wastewater is maintained separate from any potable water supply system. All equipment, piping and installation for use in the storage and reticulation of wastewater must be marked in such a way as to be distinguishable from any system for the reticulation of potable water. Warning notices written in appropriate languages must indicate that wastewater is being used.

The same regulations set treatment standards to be complied with in the use of wastewater for irrigation purposes, depending on the type of crop to be irrigated. The health authorities, however, may prescribe stricter effluent standards. The use of wastewater, however treated, for the irrigation of salad crops to be eaten raw, vegetable crops or berry fruits is forbidden. Exemptions may be granted in respect of vegetable crops and berry fruits in specified cases 52/.

Main Features of existing Legislation

DEFINITION OF WASTEWATER

Given the prevailing view in existing legislation of wastewater as a source of environmental pollution more than as an alternative source of supply, statutory definitions of wastewater tend to be frequently found in water pollution control legislation.

The few available definitions all point to the fact that wastewater originates from a use of water - whether for domestic, municipal, agricultural, industrial or other purposes - as a result of which the chemical, biological or physical properties of the water have undergone appreciable change 53/.

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LEGAL REGIME OF WASTEWATER REUSE

In a few instances, wastewater has the status of national property 54/, and as such its use is subject to the general legal regime of all uses of waters having public property status. However, in view of its implications to other water users, and to the health of the public and the environment, the use of wastewater tends to be subject to regulatory controls regardless of the legal status of wastewater per se.

Wastewater may be reemployed directly by the first user - this case generally involves the recycling of the water -, or it can be used by a third party tapping the flow which would otherwise go to waste and using it after the required treatment. An intermediate case would involve a commercial developer tapping the waste flow for treatment and resale to eventual users. The contractual relations between the supplier of raw wastewater and the developer, and between this and a final user, aside, the right to appropriate wastewater for subsequent use is subject to regulations designed to (a) prevent conflicts with other users of water who may have a claim to the return flows 55/ and (b) safeguard general public health and environmental interests 56/.

WASTEWATER USE RIGHTS

Wastewater can be tapped and used either under an existing grant of a water abstraction and use right, or under a grant of an independent wastewater use right. In the former case, a single administrative grant covers both the water use and the possible use of resulting wastewater by the original grantee. For example, under the Spanish legislation the holder of a concession to abstract and use water may use the waste generated as a result, subject to conditions relating to the treatment, quality, and intended use of the waste which are entered as an amendment to the original instrument of the concession. Despite the fact that the right to use the wastewater is, in this particular instance, regarded as an appendix to an existing water right, public notice must be given of the intended wastewater use, and health clearances obtained. When wastewater is to be used by a person other than the original grantee of the water right concession, a separate concession is required as the two uses are held to be independent of each other 57/. The relevant grant follows the rules generally applicable to the grant of water abstraction and use concessions, including in particular the giving of public notice of the intended use 58/.

In either case, the requirement that public notice be given of an intended wastewater use is obviously aimed to bring out in the open and settle the conflicts between users which may stem from a proposed interference with return flows after use, and the resulting encroachment on the legitimate claims of downstream users. However, conflict situations are not necessarily restricted to downstream users who abstract water for a consumptive use.

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Also non-consumptive users, such as fishermen and recreationists, may be adversely affected by a proposed wastewater use project to the extent that diminished return flows may affect the quality - not only the quantity - of instream waters. For the same reasons, the diminished diluting capacity of instream waters may affect the waste-carrying capacity of the stream, and, as a result, impinge on the rights of legitimate dischargers of waste downstream and upstream of the proposed wastewater use project.

Public notice requirements of an intended wastewater use are in effect also in California 59/. The legislation of other countries instead, such as Peru and the Philippines, makes it an obligation of all water users in general - including, by implication, the users of wastewater - not to harm fellow water users as a result of the exercise of their respective water rights 60/. This obligation too reflects concern for the legitimate interests of water users who may be affected by a proposed wastewater use project. However, it stops short of preventing such conflicts - as the administrative public notice requirements are meant to do - as it fails to translate into mechanisms for the preventative screening of conflicting claims. In the end, in a conflict situation, it will be for the courts to decide through the litigation process whether that obligation has been met or not.

PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT

With a view to protecting public health and the environment from the undesirable effects of wastewater reuse, the range of permissible uses of wastewater tends to be restricted by law to irrigation, and use in manufacturing processes. Exceptionally however, the use of wastewater to meet the growing demand of the domestic water supply sector is expressly contemplated in the legislation. This is the case in Spain, for instance, where such use of wastewater is permitted by the law in emergency circumstances, including national disasters, and on a temporary basis 61/. The Wastewater Reclamation Criteria in effect in California list the use of reclaimed wastewater for the recharge of domestic water supply aquifers along with the other admissible uses of such water 62/.

Concern for the undesirable effects wastewater use may have on the health of the public and on the environment in general is further reflected in the terms and conditions of the wastewater use permit or the like. In particular, the law generally directs that conditions be imposed covering such matters as the required level of wastewater treatment, the required quality of the effluent in relation to the intended use, and requirements for the avoidance of health hazards, environmental degradation, and damage to neighbouring properties 63/ - all of which must be tailored to the circumstances specific to each case by the Government agency responsible for the granting of permits.

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FINANCIAL ASPECTS

Financial assistance to promote the use of wastewater is provided for in some of the countries reviewed.

In the United States, grants may be made by the Administrator of the Environmental Protection Agency (EPA) to States, municipalities, intermunicipal and interstate agencies for assistance in the development of projects demonstrating advanced waste treatment and water purification techniques, including water reclamation and recycling techniques. The Act also provides for training grants and scholarships 64/.

In addition, the EPA Administrator may make grants to States, municipalities, intermunicipal and interstate agencies for the construction of wastewater treatment facilities providing for the application of the best innovative treatment technologies before any discharge into receiving waters with a view to, inter alia, the reclamation of wastewater and the ultimate disposal of sludge in a manner that will not result in environmental hazards 65/.

Under the Spanish legislation, financial aid or tax incentives may be granted to persons undertaking the treatment of wastewater with processes or methods leading to its reuse, or research activities on the subject 66/.

In Mexico, users of wastewater benefit from a seventy-five percent reduction in the water use charges ordinarily payable to the Government 67/.

ENFORCEMENT AND IMPLEMENTATION

The wastewater use restrictions in effect in the various countries reviewed are generally backed up by a system of penalties.

In Peru, for example, the use of wastewater for irrigation purposes without the authorization of the health authorities is punished with a fine 68/. In the case of failure to comply with the requirements prescribed by the same authorities, the fine is doubled. In case of repeated violations, a criminal sanction applies, together with the obligation to make good any damage caused.

Pursuant to the Zimbabwe Water Act, a fine and/or imprisonment is imposed on any person using wastewater resulting from electrical, mining or miscellaneous activities without the authorization of the Water Court 69/. In Algeria also, the use of wastewater for irrigation purposes without prior administrative authorization is punished with a fine and/or imprisonment. The same applies to the use of wastewaters for the irrigation of vegetables to be eaten raw 70/.

As regards implementation, substantive details on such matters as quality standards to be met by wastewater prior to use, or procedural details in connection with the granting of wastewater use permits, are generally left to regulations to be made under the principal legislation in force 71/. In addition, in the United States, federal legislation provides for a programme of public information and education on the recycling and reuse of wastewater, the use of land treatment, and methods for the reduction of wastewater volume. The programme is administered by the Environmental Protection Agency 72/.

EFFECTS ON USE OF OTHER WATER SOURCES

The availability of wastewater may have repercussions on the legal regime of uses of substitute water. Thus, under the California legislation potable water cannot be employed in the irrigation of greenbelt areas, cemeteries, golf courses, parks, and highway landscaped areas, if a substitute supply of reclaimed wastewater is available. However, (a) the source of the reclaimed wastewater must be of suitable quality, (b) the use of such substitute supply must be cost-effective, and (c) the irrigation use must not be detrimental to the health of the public, nor must it adversely affect downstream water right holders, result in a degradation of water quality, or be injurious to plant life 73/.

Conclusions

The increasing recourse to wastewater to supplement dwindling freshwater supplies - in particular, treated municipal and domestic sewage to supplement irrigation and industrial needs, and, to a lesser extent, industrial effluents to supplement the needs of industry itself - raises two sets of legal/institutional issues.

On the one hand, the risk of detrimental impact of wastewater use on the health of the public - most notably, if foodstuffs are grown for human consumption with irrigation wastewater, or if treated wastewater is used to supplement drinking supplies - is so readily apparent that the need for regulatory restrictions as to permissible uses of wastewater, and acceptable wastewater treatment levels and effluent quality need not be elaborated.

On the other hand, intercepting the flow of wastewaters prior to their returning to a stream may impinge on the rights and interests of other downstream users of the waters of that stream, both for off-stream and in-stream uses. In addition, the diluting capacity of the stream may be adversely affected by reduced overall inflows and, as a result, also the legitimate rights of upstream and downstream waste dischargers, and environmental values, may suffer.

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As a result, the use of wastewater may generate a number of conflict situations between the users of wastewater and the users of other water sources, and between the former group and the interest of the general public in a healthy aquatic environment. Legal mechanisms are therefore necessary to prevent such possible scenarios from ripening into overt conflicts, and to strike an acceptable balance among the various interests involved.

This is hardly the brief of the courts of law, which step in after a conflict has broken out, are ill-equipped to deal with complex technical issues, and whose decisions do not, in principle, have general applicability. This is why the more modern legislation tends to respond to the above concern by providing for mechanisms which seek to bring out in the open potential conflicts, and delegates the Government to arbitrate them on the basis of policies and criteria of general applicability.

Experience in other domains of legislation has taught that regulatory prescriptions tend to go unheeded unless teeth are added in the legislation to ensure compliance by the citizenry. In addition to penalty systems, the Government needs powers - from entry into private premises and inspection, to the forcible execution of a violator's obligations - necessary to deter on the one hand, and to remedy on the other, breaches of the law - subject, of course, to the checks and balances needed to prevent abuse.

As wastewater use touches on such diverse domains as freshwater resources management, irrigation, industrial and municipal water use, and public health and environmental protection, the spheres of competence of different Government departments and agencies may be involved. The need for mechanisms of coordination is readily apparent lest "territorial" disputes mar the implementation of wastewater use policies and companion legislation.

Finally, it is worth noting that, given the complexity of the technologies and techniques involved in the use of wastewater, delicate matters of technical detail tend to be left to subordinate regulations, with the main legislation only providing for the outlines of mechanisms and procedures designed to govern wastewater reuse. This lawmaking technique, while responding to a sensible partition between matters of principle and matters of detail, may nonetheless jeopardize the viability of the whole legislative package if the regulations giving the "details" are delayed.

Principles cannot be implemented until details have been spelt out in regulations - such as the acceptable quality of treated wastewater, or the acceptable wastewater treatment techniques, or standard specifications for wastewater treatment facilities.

FOOTNOTES

- (1) World Bank Technical Paper N. 51, Integrated Resources Recovery - Wastewater Irrigation in Developing Countries (1986), p.1-7.
- (2) Algeria, Law N. 83-17 of 16 July 1983 (Water Code), Art. 131.
- (3) id., Arts. 137 and 138
- (4) Belgium (Walloon Region), Decree relative to the protection of surface waters against pollution, October 7, 1985, Art. 38(3).
- (5) Food and Agriculture Organization of the United Nations (FAO), Water Laws in Selected European Countries, p.90, Legislative Study N. 10, Rome, 1975; World Bank, op. cit. supra, note 1, p.7.
- (6) Public Health Ordinance Amendment (1973), quoted in Shuval, H.I., Water Quality Management under Conditions of Scarcity, Israel as a Case Study, 1980, p. 251. It is not known as this time whether such authority has been exercised and regulations made or not.
- (7) Mauritania, Ordinance N. 85-144 of 4 July 1986 (Water Code), Art. 98.
- (8) id., Art. 65.
- (9) id., Art. 97.
- (10) id., Art 99.
- (11) Mexico, Federal Water Act of 28 December 1985, Art. 8.
- (12) Mexico, General Act on ecological equilibrium and environmental protection, 1 March 1988, Art. 119; Federal Water Act, Art. 17 (XIX).
- (13) General Act on ecological equilibrium, Art. 119.
- (14) id., Art. 128.
- (15) Federal Water Act, Art. 132.
- (16) Mexico, Federal Act on Water Charges, 28 December 1985, Art. 223 (III C).
- (17) Peru, Decree Law N. 17752 of 24 July 1969, General Water Act, Arts. 1 and 8.
- (18) Peru, Decree N. 41-70-A, Supplement to the Regulations of Title III of Decree-Law N. 17752, Art. 190.
- (19) id., Art. 183.
- (20) id., Art. 192.
- (21) id., Arts. 193 and 202.
- (22) id. Arts. 196 and 197.
- (23) id., Arts. 198, 199, 200 and 201.
- (24) id., Arts. 217, 218. The use of wastewater without prior health authorization is punished with a fine of between 1.000 and 20.000 soles oro. The fine is doubled in the case of failure to comply with the prescribed requirements.
- (25) Philippines, Presidential Decree N. 1067 of 31 December 1976 (Water Code), Art. 3(d)
- (26) id., Art. 16.
- (27) id., Art. 36.

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- (28) Rules and Regulations implementing the Philippines Water Code, 11 June 1979, Sec. 4 (C 5)
- (29) Spain, Crown Decree N. 849/1986 approving the Public Water Domain Regulations under the Preliminary Title together with Titles, I, IV, V, VI and VII of the Water Act 23/1985, Art. 272(3).
- (30) id., Arts. 273(1) and 272(4).
- (31) id., Art. 272 (1)(4).
- (32) id., Art. 272(1).
- (33) id., Art.272(5).
- (34) id., Art.274; Act. N. 23/1985 of 2 August 1985, Art. 102.
- (35) Tunisia, Law N. 75-16 of 31 march 1975 (Water Code), Arts. 105 and 106.
- (36) id., Art. 95.
- (37) id., Art. 130.
- (38) Namely, the Federal Water Pollution Control Act 1972 and 1977 (Clean Water Act)
- (39) California State Water Resources Control Board, Report N. 84-1 wr, Irrigation with Reclaimed Municipal Wastewater, a Guidance Manual, 1984, p. 10-15.
- (40) id.
- (41) id., p. 10-16; sections 13522.5, 13523, and 13524 of the California Water Code quoted at page 10-17.
- (42) State of California, Department of Health Services, Wastewater Reclamation Criteria, 1978, California Administrative Code, Title 22, Division 4.
- (43) id., Sec. 60320.5 and Art. 7 and following.
- (44) California SWRCB supra, note 40, p. 10-16.; California Health and Safety Code, Para 3, Division 5, Chapter 6.
- (45) California Department of Health Services, 1974, Regulations relating to cross-connections, California Admin. Code, Title 17, chapter 5.
- (46) California SWRCB supra, note 39, p. 10-16.
- (47) California Water Code, Sec. 1210, West Supp., 1984; California SWRCB supra, note 39, p. 11-3.
- (48) id., California Water Code, Sec. 1211, West Supp. 1984.
- (49) California SWRCB supra, note 39, p. 11-7; California Water Code, Sec. 1201 (West, 1971): the priority of appropriation permits is fixed by the date of filing, and the amount of water requested is recorded.
- (50) California Public Utility Code, Sec. 1503 (West, 1975). California SWRCB supra, note 39, p. 11-9.
- (51) Zimbabwe, Act. N. 41 of 1976 (Water Act), Sec. 60.
- (52) Zimbabwe, Public Health (Effluent) Regulations Sec. 3,4(3)(4) and schedule, Sec. 6 (Rhodesia Government Notice N.662 of 1970).
- (53) According to the Belgian water pollution control legislation, wastewater is defined as:
 - artificially polluted water or water that has already been used, including cooling water; or
 - rainwater run-off artificially occurring; or
 - water which has been treated for subsequent discharge.The law then groups wastewaters under three categories, i.e., domestic, agricultural, and industrial (see supra note 4, Art.2).

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Under the legislation on wastewater charges in force in the Federal Republic of Germany, wastewater is defined as water whose properties have undergone a change as a result of domestic, commercial, agricultural or other use (Act pertaining to Charges Levied for discharging wastewater into waters, 13 September 1976, Art.2).

The Romanian Water Law of 1974 describes wastewater as (a) water whose chemical, biological or physical properties have been altered through utilization; and (b) water from rainfall or other sources which, without having been put to any use, has become charged with foreign substances derived from social or economic activities (Act N. 8/1974 of 29 March 1974, Art. 11(3)).

- (54) See Israel, Mexico and Peru .
- (55) See the legislation of Spain, Peru and California.
- (56) See the regulations in force in Israel, Peru, California, the Philippines and Zimbabwe.
- (57) Spain, Regulations, Arts. 272,273; Water Act, Art. 101.
- (58) Regulations, Arts. 93 and following
- (59) California SWRCB supra, note 39, p. 11-7.
- (60) Peru, supra, note 17, Art. 20(d); Philippines supra, note 25, Art. 24.
- (61) Spain, Regulations, Art. 272 (5).
- (62) California, supra, note 42, Art. 5.1.
- (63) Spain, Regulations, art. 272 (1)(3). Under Peruvian legislation, the prescriptions of the health authorities are entered as conditions in the wastewater reuse licence.
- (64) United States supra, note 38, Sec. 105, 109 and 111.
- (65) id., Sec. 201.
- (66) Spain, Water Act, Art. 102; Regulations, Art. 274.
- (67) Mexico supra, note 16.
- (68) From a minimum of S/. (soles oro) 1,000 to a maximum of S/. 20,000. See supra, note 24.
- (69) Zimbabwe supra, note 51, Sec. 134 (1.i). In the case of first conviction, the fine may not exceed Z\$ 500 (equivalent to US\$ 222 at the present UN exchange rate), and the term of imprisonment six months. Both the fine and the term of imprisonment are doubled in the case of a second or subsequent conviction.
- (70) Algeria supra, note 2, Art. 145. The fine may vary from a minimum of DA 2,000 to a maximum of DA 200,000 (US\$ 250 to 25,000 at the present UN exchange rate). The term of imprisonment varies from a minimum of 2 months to a maximum of 2 years. In addition, the violator is under an obligation to make good any damage caused to the public domain or to third persons (Art. 157)
- (71) See, for instance, Algeria supra, note 2, Art. 138 (2); Mauritania supra, note 7, Art. 98
- (72) United States, supra, note 38, Sec. 214.
- (73) California Water Code, Sec. 13550 and 13551.

ANNEX VII

EFFICIENCY AND EQUITY IN WSS
REGIONAL OVERVIEWS

by M. Solanes

The Water Resources Branch of the United Nations Department of Technical Cooperation for Development (UN/DTCD) has reported in 1989 on several water resources development projects carried out in Africa, Asia and Latin America during the current decade. The countries concerned are Ghana, Nigeria, Sierra Leone, The Sudan and Tanzania in the African Region; Bangladesh, China, India, Iraq and Malaysia in Asia, and the whole Latin American and Caribbean region with details on Argentina, Brazil, Chile and Colombia.

AFRICA

The lack of clarity of policy towards cost recovery contributes to the financial problems of the water authorities. This issue is central in rural areas, where the economic base is usually weak, and there are a multitude of different organizations pursuing parochial policies which are not co-ordinated. However, with the policy that communities should be involved and own their water supply systems, having them pay at least for operation and maintenance costs provides hope for relieving the financial burden on Governments.

The acts of incorporation of water utilities usually require them to seek the approval of Governments before imposing tariffs. The experience is that in some cases because of political reasons, approvals are delayed to the extent that by the time they are given, high inflation rates have made the new tariffs ineffective. The Ghana Water and Sewerage Corporation's financial performance in recent years may be traced initially to its inability to obtain approval from the Government to a tariff increase in 1978, when it was due. It was not until 1981 that this was granted, and by then the increase had already become totally inadequate. The next tariff increase was submitted in 1982, and finally approved in February 1984, by which time the corporation was already heavily in debt.

In Sierra Leone, communities benefiting from various water supply systems do not usually make any financial contribution towards the cost of implementation (Harleston, 1986). This is usually provided by the Government and funds from external sources. Cost is recovered by way of labour provided during construction. Also, when the communities own the systems, they are responsible for the costs of operation and maintenance. This did not work so well in the past, but with the integrated approach introduced since 1980, recovery is better because the educational campaign has helped to create an awareness of the importance of having the systems working all the time.

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In Ghana, the Government in the past provided the initial investment for both urban and rural water supplies. Tariffs were collected, but not enough to cover operation and maintenance. The Government until 1984 was expected to provide subsidies to make up the shortfall in the actual amount needed. In fact what was provided did not bridge the gap. Since 1984 subsidies have been stopped and the Corporation is required to be on its own as far as operation and maintenance are concerned. Investment funds are still being provided, but very often with external assistance. The policy is now for urban areas to pay the full cost of providing the service (initial investment and operation and maintenance costs), while in the rural areas at least the operation and maintenance costs will be recovered based on charges per household.

In Nigeria, the Federal Department for Water Resources (FDWR) recognizes that the cost recovery mechanism in rural areas is highly ineffective. For urban water supply, where house and yard connections have been dominant, costs are recovered directly through metered consumption charges or flat rates. In the case of rural areas where water supply inadequacies are very acute, public standposts dominate. Instead of direct charges for water consumed, the water agencies apply some general charges on the Local Government Authority (LGA) for water supplies. The charges differ from state to state. The LGAs on the other hand, offset some of these charges through indirect taxation of people in the rural areas. The revenue generated from consumers is said to be insignificant and unable to sustain even the operation and maintenance of these facilities. Initial investment for water supply projects in both urban and rural areas are borne by the Government. The FDWR recognizes the necessity to institute appropriate cost recovery measures for equipment, chemicals and spare parts for the operation and maintenance of existing facilities. In the case of rural areas, the UNICEF-assisted Low Cost Rural Water Supply and Sanitation Programme being carried out in the States of Gongola, Iaro and Kwara, is expected to provide information to develop an acceptable cost recovery system (Okeke, 1986).

In the Sudan, the instruments setting up the water authorities require that they fix rates to collect charges for services provided. As with the other countries, the initial investment costs for urban and rural water supplies are provided by the Government. In the rural areas, the communities contribute labour. For operation and maintenance, costs are recovered by cash contributions.

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In the United Republic of Tanzania, the initial investment in both urban and rural water supplies is provided by the Government, with assistance from external funding agencies. The notion that water is a free good has resulted in the past in a policy by which the Government also provided the funds for operation and maintenance. The subsequent failures and the magnitude of the burden have forced a change in policy: the communities own the systems and pay for operation and maintenance costs (Simonson, 1986).

In the past, it has not been the practice to collect tariffs and service charges for water supply in many African countries. The situation has changed. In urban areas, where supply is by house connections or public standpipes, it is possible to collect tariffs by disconnecting those who do not pay. The organizational structure, the manpower and the service provided must be adequate. However at the local levels, where the organization and staff are not in place, it is not possible for water authorities to collect tariffs effectively. As the tariffs cannot be collected, the utilities have no funds to purchase spares and consumables to operate and maintain the systems. These therefore break down often, or no service is provided. As the beneficiaries do not receive service, they also refuse to pay. Thus a vicious circle is created.

In Tanzania, Baliale (1986) points out that owing to such problems it is not unusual to have only 30 per cent of the total schemes working at any time. Sometimes there is also a difficulty in keeping records as to who has paid and who has not. Since it has now been accepted that the water supply systems are owned by the communities through their direct participation, this problem could be on the verge of being solved. Communities will be required to fix their own tariffs within general guidelines to be provided nationally.

ASIA

In China, the costs of rural water supply are met by local economic institutions (such as communes, production brigades and teams) and local governments (such as counties and prefectures). However, in urban areas, the cost is recovered from the beneficiaries. In Malaysia, the concept of cost recovery through adequate water rates is well established. Billing and collection procedures are in operation and collections are generally good. However, the investment costs of water supply and sanitation in newly settled and less developed areas are provided by the agencies of the federal Government. In Iraq, charges are required for water delivered through house connections only. Moreover, the existing tariff system is not adequate to cover operation and maintenance costs. As a result, the Government has to bear the lion's share of water supply and sanitation costs.

ANNEX VII

The water supply and sanitation systems in India and Bangladesh are primarily dependent on government assistance. In rural areas of India, water supply is financed by the state. The share of the Government's contribution to urban water supply varies from state to state. In the state of West Bengal, the government pays not only for investment in water supply and sanitation, but also for operation and maintenance. An analysis of the water supply systems in the state of Karnataka shows the following trends: (a) the proportion of towns with deficits in water supply and sanitation budgets has increased from 74.7 per cent in 1974-75 to 80.2 per cent in 1978-79; and (b) the problems of deficits in city budgets are more acute in the case of small and major towns. The performance of medium towns in this respect is slightly better.

In Bangladesh, the contribution of the local population to the operation and maintenance costs for handpumps in rural areas is very limited. In most cases, all costs for rural water supply are paid by the state. The percentage of government subsidy in urban water supply is also very high.

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In most countries of the Region, 40 to 60 per cent of water production is not accounted for. In addition, arrears in collection might amount to 30 to 40 per cent of total billing. These constraints are aggravated by inefficient user records, inadequate accounting systems, no metering of consumption, etc. In fact, such constraints result from the fact that water supply and sanitation are conceived as engineering activities rather than as integrated managerial systems.

Water pricing, if properly used, is a powerful tool for investment optimization, demand management, and equitable distribution of income and resources. Economic pricing requires metering of consumption and use of marginal costing to establish tariffs levels. However, there are few metered systems in Latin America. Even those systems which have metered volumes establish tariffs on the basis of accounting, and not of economic costs. In addition, the accounting systems of many agencies are chaotic - a fact that seriously limits the possibilities of knowing actual prices. The situation is aggravated by political tariffs limiting the financial autonomy of water supply and sanitation agencies.

Prompted by inadequate user discipline and lax administrative monitoring, treated water is used for non-intended purposes (gardens, car washing) and prices are not used to even out peak demands, or to give the supplier the resources required to meet these needs.

ANNEX VII

The institutional weaknesses are often aggravated by defective collection of receivables in arrears. This, and the lenient sanctionary systems, seriously limit the institutional capabilities of the sector. The inflationary context of the Latin American economies demands rapid collection of revenue. Otherwise the financial needs of the supplying agencies are not met. However, a persistent emphasis on the social aspects of water supply and sanitation services limits sanctions and fines for default in tariff payments. This conception even applies to commercial users. Thus, cost coverage becomes an intractable problem, since poor collection procedures are coupled with policies that in fact reward defaulting users.

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