

INSTITUTIONAL FRAMEWORK OF WATER MANAGEMENT IN SPAIN: STRENGTHS AND WEAKNESSES FOR COPING WITH ENVIRONMENTAL RISKS AND THE NEW SOCIAL GOALS

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Over the last 150 years, water has constituted a central issue of the political debate in Spain. The first Water Law, devoted to codifying systematically the until that moment disperse water rules, was passed in 1866: in it the institution of the *hydraulic public domain* (*dominio público hidráulico*) was clearly set up, although only concerning surface waters. At the end of that Century, when the country lost its last colonies (Cuba, Puerto Rico and The Philippines) Hydraulic Policy was considered by the socio-political movement called *Regeneracionismo* as the main way of *rebuilding the nation*: water policy became a national, supra-parties field, a metaphor of the Policy that the nation had to implement in order to redeem itself. In 1902, the first National Hydraulic Plan was launched and in 1911 the Big Hydraulic Works Law (according with which the Government will pay the irrigation infrastructures) was passed: both measures meant the triumph of the infrastructural Civil Engineers' strategy over Forest Engineers' one. In 1926 River Basin Authorities (*Confederaciones Hidrográficas*) were established under the rule of the former. In 1933, the first Socialist Public Works Minister in the history of Spain drew up the second National Hydraulic Works Plan, and after the Civil War (1936-1939) Franco's Regime put it into practice, with a specific social orientation: from 1940 until 1980 reservoirs capacity increased from 3.000 to 40.000 Hm³; irrigated land from 1.300.000 ha. to 3.000.000 ha., and hydropower capacity from 1.340 Mwh to 14.661 Mwh. All through out this period, the Hydraulic Policy acted as one of the major instruments of *legitimation* of the polical regime.

After 1976, during the *democratic transition*, two main changes took place in the field of water policy: firstly, the restructuration of the State, from a strongly centralised model to a cuasi-federal model (*Estado de las Autonomías*), in which water related issues are shared by the central government (inter-regional river basins authorities, public works of general interest, water transfers between river basins, basic environmental legislation and economic planning) and the regional governments (intra-regional river basins, municipal water supply, flood defences in urban areas, regional and land use planning). Secondly, in 1985, a new Water Law was passed, with two main new features: the *public domain* was extended to *ground waters* and *planning* (at national and river basin level) was set up as a function under which all activities affecting water had to be developed. Meanwhile, the development of hydraulic infrastructures went on: reservoirs capacity now reaches 50.000 Hm³ and irrigated 3.400.000 ha.

The social discussion about the causes and effects of the 1992-1995 drought and the simultaneous heated discussion of the drafts of National and River Basin Hydrological Plans (as established in the 1985 Water Law and still with a traditional infrastructural-supply approach: a total of 1.200.000 new hectares are forecasted) have marked a historical break down in the Spanish water policy. The economic, social, cultural and political changes of the last decades are now posing new interests, values and goals concerning water management that challenge the current *institutional framework* of the hydraulic policy.

In this text, the notion of *institution* applies both to structures of power and relationships as made manifest by organisations with leaders, memberships or clients, resources and knowledge; and also to socialised ways of looking at the world as shaped by communication or information transfer (O'Riordan & Jordan, 1996), and to patterns of behaviour that operate according to norms, expectations and belief systems (Haas 1995). In this sense, the central issue in the present Spanish water policy is the unresolved crisis of the traditional water *policy community* that has ruled hydraulic policy all through out so many decades, whose cohesion was guaranteed by the coincidence of the economic interests, the perception of legitimacy and the homogeneity of technical criteria shared by its limited number of participants (politicians, economists and engineers serving the Administration, irrigators landowners and building companies) (see

Annex).

In this respect, some key topics that, as in other countries, are under discussion now in Spain are:

- the need for a cultural shift
- the meaning of water demand management
- subsidiarity principle
- improving knowledge and information
- change in the water permits system
- reform of water administration
- introduction of full cost recovery

Cultural shift

In Spain, over the last Century, water scarcity has been addressed mainly by hydraulic infrastructure. Modern behaviour has been characterised by a general acceptance and expectation of unlimited water abundance, thereby disregarding projects costs and water use efficiency. This has transformed the traditional culture which helped the population co-exist with the irregularity and scarcity in a semi-arid area and has contributed to make the water related conflicts more acute. The present major and general issue consist in re-creating a *culture* which involves managing *water as an irregular and scarce resource*, in which the scarcity is determined not only by physical reasons, but mainly by its social, economic and ecological costs. Consequently, the long tradition of supply management should be integrated into the broader approach of demand management.

Management of water demand

Water demand management implies the combination of both *technical* and *political means*. Among the former, reduction of water losses in the production-supply-distribution system, more efficient irrigation techniques, re-use of wastewater, allocation of water according to different quality requirements must be mentioned. Among the latter they stand cultural, economic and regulatory instruments which affect the user's behaviour and facilitate and govern the application of technical strategies.

I am going to focus on the situation and debate about these last

instruments in Spain.

Subsidiarity

In order to improve management practices, it is generally suggested that greater *decentralisation and participation* should be promoted, thereby promoting *capacity-building*, as well as user responsibility for bottom-up policy development patterns.

But user participation requires *institutional reforms*. Institutional reforms do not only imply the change of the structure of the organisations involved with water management, but also the shift of interest groups, scientific disciplines that are represented within them, their priorities, the sets of rules they obey.

As a precondition, institutional reforms will only take place if a sufficient degree of *transparency and access to information* is reached.

Knowledge and information

Concerning information, a crucial issue to achieve water management goals is to have an accurate *knowledge of water issues* (natural resources, availability, demands, consumption, sectoral distribution of water use, quality, costs, productivity, trends and so on). The information presently available is not always reliable, both on the demand and on the resource assessment side. This leads to significant planning errors and lack of anticipation of problems. Therefore, developing knowledge and means for resource, ecosystems and use monitoring and assessment is a fundamental action for improving the current situation.

Detailed *economic assessment of management* alternatives, e.g. new resource and water saving, are needed in order to make decisions about long term investments. Assessments have to take into account all the costs and benefits for the whole society, and not only for the direct beneficiaries concerned.

In this sense, the official view that the unit cost of water conservation policy (modernisation, direct re-use, etc) is higher than the unit cost of the generation of conventional resources (new reservoirs, water transport and intensification of the exploitation of ground water) is a central issue in the modernisation debate. This official view is firmly established at all levels in

Spanish Administration and main stakeholders.

Change in the water permits system

The present system of permits is rather inflexible: water rights granted to specific user, for specific objective. Institutional change also involves correcting this situation to allow for voluntary transfer of water rights between users. Those transfers could be temporal or permanent and should be supervised by River Basin Authorities. They could take the form of direct agreements between users, option rights conditioned according to the level of rainfall or other *formulae*. These kind of transfers would stand as efficient instruments to ensure meeting the requirements of more priority and valuable uses. Given the high percentage of water for irrigation purposes (and part of it is usually allocated to annual irrigation crops of little value), those transfers would not greatly affect this sector. These farmers, potentially threatened by the transfer, would receive compensations for losses. In cases in which risks of negative effects exist, means of defence of irrigation should be applied jointly with other policies, e.g. spatial planning policy when social, ecological and landscape criteria justify it.

Although it would only affect a small part of the resources, introducing flexibility in the permit system would have some positive effects on water management as a whole. It would act as a revaluation mechanism of water as a scarce resource and would introduce the economic dimension in the users' mind, leading them to think in terms of opportunity costs and of level of marginal productivity in water use.

Implementing those transfers between users would lead to prevent situations in which towns suffer water shortages, despite their proximity to extensive irrigation areas. They would lead also to avoid solving these deficits by means of transfers from far-off regions.

The institutional conditions necessary to implement those means are:

- a) clear knowledge of users or entities who are water rights' holders.
- b) the establishment of a legal framework which would facilitate and orient *water markets*

The *transparency and equity* of the resulting solution and the achievement of a *specific type of economic efficiency*, with different social and regional consequences, would depend upon the *formulae* which will be

adopted for both issues.

Reform of water administration

Water management organisations, especially River Basin Authorities (Confederaciones Hidrográficas) should be reformed in the five following areas:

1) They should become true *documentation and research* centres, with *information* systems on water availability, use and quality, open to the general public.

2) River Basin Authorities should rely on personnel with *multidisciplinary* training, so as to take on board the multiple functions of water resources. Staff of organisations dealing with water management should be trained in order to acquire a general understanding of the main ecological processes in wetland and riverine ecosystems.

3) River Basin Authorities should become self managing bodies, with *full autonomy and financial responsibility*. This would imply not only autonomy in deciding costs, but also the obligation to search for funds needed to cope with those costs. This financial autonomy would contribute to reinforce the responsible management of the River basin Authorities which has been made more difficult because of its role in claiming for and benefiting from public investment.

4) The re-enforcement of the River Basin Authorities' autonomy and the transfer of part of the decision-making and costs would demand *a greater participation of the Users' Associations*, including associations of urban users and environmental organisations. So, reforms of the consultation organs, such as Water Councils, in the sense of greater and active participation of more diverse interest groups are needed.

5) The *subsidiarity principle should not be seen as counterpoint to solidarity*, but rather as complementary principles. The regional entities have two ranges of responsibilities, namely for local interest and for articulating or joining them to national and global interest. In fact, River Basin Authorities are institutions which bring together areas within natural boundaries but belonging to different regions, between which practical co-operation and mutual solidarity relations take place. Consequently, those entities have also a competence in fostering explicit and transparent inter-regional solidarity.

The economic system of water

Another important issue is the intense controversy over the revision of *the financial and economic regulatory system* of water as an instrument for the rationalisation of its use and management. Since the beginning of this century, the financial and economic regulation of water has been in line with a water policy based on the *flexibility of supply*. Reforms introduced by the 1985 Water Act, apart from their incomplete implementation, have proved to be insufficient to accomplish this task. The charges and rates fixed in the Water Act have proven to be complicated to apply and difficult to collect as well as manifestly insufficient to cover the amortisation costs of investment and of the exploitation costs of the hydraulic systems. The financial and economic regulatory system defined by the Act maintains the two basic characteristics of the previous situation, i.e. the *compensatory character* with respect to the State investments and the *subsidisation of costs*. All this despite its original aim to revise the old system.

The financial outcome of the newly defined *charges and rates* still represents a subsidy of the order of 40% of total investment. This subsidy rises to 90% when the conditions of the Act of 1911 are applied. These payments only cover 45% of the total water used for irrigation and urban and industrial supply and 4% of all the water used in hydroelectric generation. The remainder of the users do not make use of the hydraulic works financed by the State and are, therefore, exempt from these rates and charges as there is no payment required for water extraction at source.

There is general agreement that the incorporation of the value and the cost of water as a resource into the price paid by the user is a fundamental condition from the perspective of either its correct allocation (economic efficiency) or of the need to reduce the level of structural intervention (defence of the environment).

But serious concern arises regarding the affects on irrigation of this full cost recovery approach. The marginal productivity of water in Spain is very different among regions: It is lower in irrigation farming in the northern half of Spain, with a minimum of 35 ptas/m³ in Aragon and is higher towards the south with a maximum of 105 ptas/m³ in Murcia. In some areas of intensive greenhouse farming, an output of 1,000 ptas/m³ can be achieved.

These productivity figures set the context for the *debate of the effects that an increase of the water price would have on the competitiveness of*

Spanish irrigation farming.

The competitiveness of Spanish large scale irrigation crops (cereals, oil-bearing crops, industrial and animal fodder crops -- together they account for 65% of total irrigated land) depends to a large extent on the low cost of water. If the cost of water were to increase substantially, they would not be able to compete. This would be particularly the case for irrigation crops with high energy inputs.

On the other hand, irrigated agriculture using groundwater resources already frequently bears costs that are higher than those foreseen for surface water, in case of full supply costs passed to the users. Therefore, it is important to take into consideration the territorial location of those areas, which already suffer from aquifer overexploitation and saline intrusion and in which the sole application of economic criteria will not contribute to solve environmental problems, nor to the sustainable use of the resources.

So a differential policy must be established according to the different areas within the country, based upon the expected irrigation profits, depopulation risks, the degree of competition for water in different sectors and the environmental aspects.

ANNEX*The hydraulic policy community in Spain*

Following Pérez-díaz, Mezo and Alvarez Miranda (1996), as regards the traditional Spanish hydraulic policy it is possible to identify a *policy community*. The core of the traditional hydraulic policy community in Spain was formed by politicians, economists and engineers serving the Administration, irrigators landowners and building companies. This ensemble remained bound together by co-ordination among the governmental bodies involved in the policy planning and in its implementation, on the one hand, and by the tacit consensus regarding the goals to reach and the tools to use, on the other.

From an organisational point of view, the cohesion of the hydraulic policy community was facilitated by the concentration in the General Directorate of Hydraulic Works (DGOH), belonging to the Ministry of

Public Works, of the major decision about water policy, both related to hydraulic works and water management (the main aspect) and with quality monitoring (the latter subject considered until recently of less interest). Although River Basin Authorities (Confederaciones Hidrográficas) formally had a relevant role to play, in practice they have lacked autonomous power, and they have served to a great extent as branches (offices) of the General Directorate, by which they were funded. Several other bodies operated in relation with the DGOH: some of them, like the Geological Service of Public Works, directly depending on it; others, like the Centre of Hydrographic Studies, with more distant links with it. Decisions came after a process of consultation and discussion among the technicians of these bodies and the DGOH, but the General Director who enjoyed a big autonomy had the last word. On the other hand, a close agreement between the Ministries of Public Works and that of Agriculture concerning goals (although there could exist disagreements as regards the priorities of each specific moment) facilitated the co-ordination between the hydraulic works building and the implementation of irrigation schemes.

Communication between all these decision makers and irrigators landowners and building companies were established by the *hydraulic policy community*. After the civil war (1936-1939), in an initial context of economic isolation and political authoritarianism, the requests for more irrigation schemes were perceived as undoubtedly legitimate. At the end of the '50s, the change in the economic policy towards a faster economic development, just enforced this perception of legitimacy. Both directly or through the river basin authorities, the irrigators' associations (Comunidades de Regantes) managed to place their demands at Public Works and Agriculture Ministries, that applied their political willingness, their technical expertise and the necessary funding for their specific implementation. The cohesion of the community was guaranteed by the coincidence of economic interests, the homogeneity of technical criteria and the fluency of the contacts inside and through the Administration. This cohesion, in its turn, gave stability over the time to the hydraulic policy contents. The community reinforced its cohesion through the selection of goals and means for the policy, and so doing it reproduced both the way for decisions to be made and their contents. So, the traditional policy of water supply corresponded to the characteristics of the hydraulic policy community responsible for its definition and implementation.

The changes in the traditional hydraulic policy community during the '80s and '90s: the new issue network

The process has been similar to what has happened in other countries: Some fissures have appeared in the former unanimity of the traditional community. The civil servants, firstly the engineers themselves, are exposing some discrepancies in different ways. Interest groups are divided and promote their interests cautiously and prudently.

Behind this new situation there are two structurally inter-related shifts. Firstly, a increase in the number of agents in political deliberation: the *policy community* has changed into a *issue network*, larger and less integrated that it was previously, with new actors that operate in a much more open public stage. This increase has been caused by four inter-related transformations in the institutional framework of political life: the implantation of the democratic regime, the subsequent development of the logic of competition among political parties, the activation of public opinion and, very importantly, the change of the political territorial structure of the Spanish State, mainly through the emergence of the State of Autonomies (nearly a federalist model) and, secondarily, through the growth of the power of local councils. All this has facilitated the appearance of new social movements and new representatives of local feelings and interests.

The opening up of the political arena and the rise in the number of actors, have caused the second structural change: the appearance of new points of view and arguments that have eroded the cultural basis of the traditional hydraulic policy: new perceptions of costs and benefits of hydraulic works, criticism of the notion of solidarity in which the water transfers option is based, and review of the ways of deliberation and decision making.

In the early '90s, the five years long drought and the crisis of the socialist government have accelerated these changes. But, as they are structural transformations, they still remain once the drought is over and a new party is ruling the country.

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LA GESTIONE DEL BACINO FLUVIALE DEL RIZANA E L'APPROVVIGIONAMENTO DELL'ISTRIA SLOVENA CON L'ACQUA POTABILE CARSICA

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La Slovenia, l'Istria slovena e la gestione delle acque

Dopo la proclamazione dell'indipendenza, nel 1991, la Slovenia ha effettuato una riforma dell'amministrazione statale e locale. Sull'esempio delle dimensioni delle unità amministrative dell'Unione Europea, i precedenti 61 comuni sono stati suddivisi in 192. I comuni hanno competenza di gestione del territorio - rilasciando permessi di costruzione, licenze artigianali, ecc.- e con ciò possono approvare piani di sviluppo che riguardano gli interventi in campo ambientale tranne quelli relativi alle opere di interesse nazionale (centrali elettriche, autostrade, ecc.), che sono di competenza statale. Rispetto all'organizzazione amministrativa dell'UE, la Slovenia non conosce ancora una divisione in regioni, intermedie tra Stato e Comuni: la precedente suddivisione regionale è stata cancellata senza essere sostituita.

Nel settore della gestione delle acque in passato esistevano otto comunità regionali. Dopo la riforma amministrativa, le loro competenze sono state incorporate dal Ministero per l'ambiente. Per la regione della Primorska (il Litorale e il suo entroterra) la sede della comunità è Koper (Capodistria). Compito di questi Enti, secondo la legge sulle acque ereditata dal vecchio sistema socio-economico, è la preparazione dei piani per la regolamentazione delle acque, dei laghi e della costa e del loro sfruttamento economico.

Attualmente, è in preparazione la nuova legge sulle acque, che dovrebbe integrare quella del 1993 sulla tutela dell'ambiente, affrontando i problemi della difesa delle acque e del loro sfruttamento economico dopo il cambiamento del sistema socio-economico⁴.

L'entroterra del litorale sloveno è costituito dall'Istria slovena, con i bacini di quattro fiumi che si gettano nell'Adriatico: il Rižana (Risano), il Badaševica (Cornalunga), il Drnica (Derniga) e il Dragonja (Dragogna) (Fig. 1). L'Istria slovena è una regione in prevalenza collinosa formata di flysch e ad Est è delimitata dal rilievo carsico.

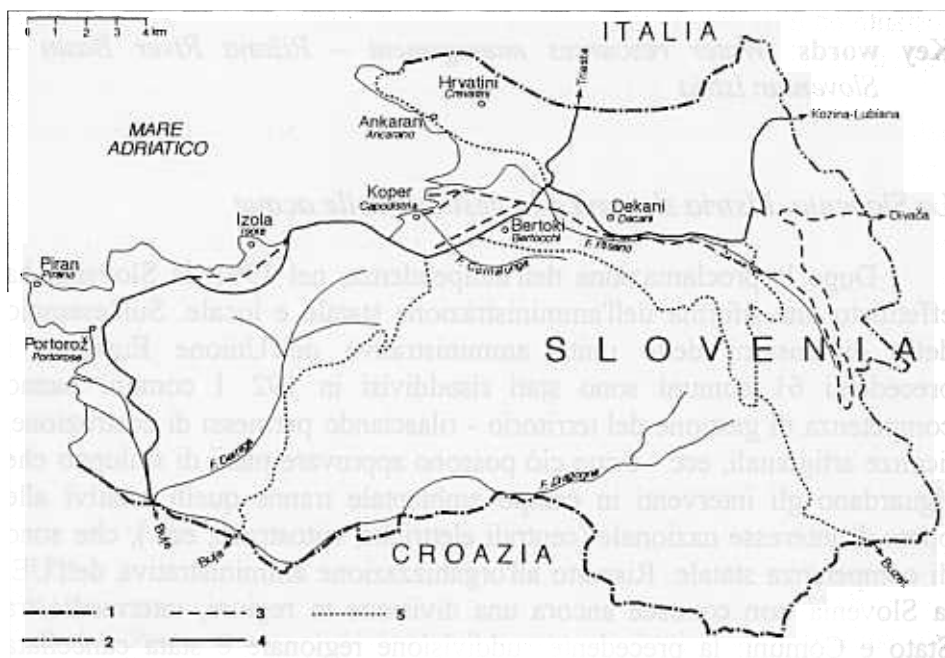


Fig. 1 - L'Istria slovena – 1: Confini di Stato; 2: Confini di Regione; 3: Ferrovia; 4: Strade nazionali; 5: Strade regionali.

⁴ Tale legge dovrebbe dare maggior importanza alla proprietà della terra, introdurre concessioni e permessi speciali per i grandi consumatori, regolamentare il livello massimo d'inquinamento delle acque, predisponendo la gestione integrata dei bacini fluviali, dei laghi e del mare.

Il clima è submediterraneo. In luglio, nel mese più caldo, la temperatura media lungo la costa è tra i 23 e i 25°C; in gennaio è appena superiore ai 3°C. Le precipitazioni maggiori si hanno nei mesi autunnali (ottobre, novembre); il massimo secondario in giugno. La quantità delle precipitazioni è di 1000 mm/a lungo la costa e arriva a 1350 mm/a nella parte collinosa più elevata. D'estate si verificano periodi di siccità a causa delle scarse precipitazioni e delle alte temperature.

Sul suolo di origine flyschoida si è sviluppata una rete fluviale normale. I due fiumi maggiori sono il Rižana e il Dragonja. Gli altri sono di minore importanza e hanno carattere torrentizio, con disseccamento estivo. Il Rižana, grazie alla sua sorgente carsica, rimane l'unica fonte d'acqua costante ed è di grande importanza anche per l'approvvigionamento idrico degli abitanti.

Il forte processo di litorizzazione ha provocato una grande differenza nello sviluppo tra la fascia costiera e l'entroterra. Solo negli ultimi dieci anni si può parlare di una diminuzione di questa differenza grazie ai maggiori investimenti nell'infrastrutturazione dell'entroterra. Questo ha portato anche all'arresto dello spopolamento delle campagne e all'aumento degli abitanti in alcuni villaggi.

Il Rižana e il suo bacino

Le sorgenti maggiori del Rižana sono le sorgenti carsiche al punto di contatto tra il calcare e il flysch presso il villaggio di Bezovica. Il fiume corre dalla sorgente al borgo di Miši vicino a Dekani in una stretta valle fiancheggiata a sinistra dalla ferrovia e a destra dalla strada regionale Koper-Rižana-Buzet e più a valle dalla strada Koper-Lubiana. I versanti del lato sinistro sono coperti dal bosco submediterraneo e da arbusti che in alcune parti si sono estesi anche sulle terrazze non coltivate. Sulla sponda destra della sezione superiore, i versanti sub-pianeggianti sono cosparsi di vigneti e frutteti. Quando la valle, a metà percorso, si restringe, anche i versanti di questo lato si coprono di bosco e arbusti.

Dopo la realizzazione di opere di difesa contro le piene, le superfici coltivate si sono sviluppate soprattutto nella parte bassa della valle. I terreni pianeggianti sono adatti alla lavorazione meccanizzata e idonei all'irrigazione. Inoltre è più facile l'accesso alle parcelle. Prevalgono colture miste su piccole parcelle disperse (vigne, frutteti, ortaggi, prati) il che

rappresenta il modello colturale tradizionale in Istria, dove le parcelle sono spesso molto piccole. In alcune aree, soprattutto dove la valle si allarga da Dekani verso il mare, si nota una specializzazione su parcelle più grandi frutto dell'accorpamento di più parcelle e delle migliorie apportate al terreno. All'inizio questi miglioramenti non sono stati accompagnati dalla razionalizzazione dei sistemi di irrigazione, che si è invece prodotta soprattutto negli anni 80. Oggi la pianura tra Dekani, Bertoki e Ankaran è la superficie agricola più estesa nell'Istria slovena, con una marcata specializzazione orticola.

Nella parte bassa della valle sono presenti alcune fabbriche in una piccola zona industriale. L'industria chimica "Kemplast" prende dal Rižana per il suo processo produttivo 24 l/sec e restituisce 76000 m³/anno di acqua parzialmente depurata. Una latteria usa e restituisce 43000 m³/anno, l'industria meccanica "Lama" preleva e restituisce 170000 m³/anno di acqua parzialmente depurata. L'impianto di depurazione comunale tratta soltanto le acque comunali e le acque industriali in parte pre-trattate della città di Koper, di Bertoki, di Ankaran e di Hrvatini, che sono collegati alla rete di raccolta (Fig. 2). La costruzione di quest'ultima si sta rapidamente completando anche per gli altri centri abitati.

Il flusso medio del Rižana alla stazione di misurazione di Kubed (un chilometro sotto la sorgente) è di 4,3 m³/sec. Bisogna tener conto che il regime naturale è alterato, perché 240 l/sec vengono presi per l'approvvigionamento idro-potabile. Il flusso minimo è di 0,05 m³/sec, quello massimo 90,9 m³/sec. Il deflusso minimo vitale è valutato in 0,11 m³/sec ma d'estate può succedere che a causa della siccità il flusso si trovi sotto questi valori.

Il consumo medio quotidiano dell'acqua nell'Istria slovena è di 308 l/sec. Il consumo massimo si ha nei mesi estivi a causa del turismo, quando ad esempio raddoppia la popolazione di Piran, ed è di 400 l/sec. Nei periodi di siccità prolungata il sistema dell'Acquedotto del Rižana, da cui viene approvvigionata l'Istria slovena, può assicurare 430 l/sec. Di questi, il 56% proviene dal Rižana, il 30% dall'Acquedotto Carsico di Sežana e il 14% dall'Acquedotto croato. Questi dati non tengono conto dei 100 l/sec provenienti dalla sorgente di Sicciole, che si trova in un'area di confine ancora non definitivo tra Slovenia e Croazia.

Il Rižana ha 247 km² di entroterra prevalentemente carsico che si trova per la maggior parte fuori dall'Istria slovena (il Carso di Podgorje, le



Fig. 2 - Rete di raccolta delle acque reflue: 1. esistente 2. pianificata

valli di Podgrad e Brkini). Soltanto la parte che si trova nel comune di Koper è stata protetta attraverso l'istituzione di un sistema di aree di tutela (Fig. 3), nelle quali sono proibite o limitate le attività economiche potenzialmente pericolose per le risorse idriche (agricoltura, industria, traffico). In particolare, nella I area di tutela (la sorgente e il bacino di pompaggio) sono permessi esclusivamente la silvicoltura, i pascoli e i prati con uso limitato di concime, fissato ogni anno dagli uffici di competenza, nonché la realizzazione di punti di approvvigionamento idrico. Non è permesso l'uso di prodotti chimici per la difesa delle piante. Nella II area (destinata alla protezione delle acque di superficie e sotterranee dall'inquinamento) è permesso il rinnovo/sostituzione degli edifici, previo il loro collegamento alla rete fognaria. Sono incentivate attività legate all'economia forestale, all'agricoltura e alla ricreazione, anche queste con l'obbligo di depurazione e di collegamento alla rete fognaria. E' proibito l'uso di biocidi a base di piombo, mercurio, arsenico, idrocarburi clorati, acido cianurico, fenolo, cresolo e altre sostanze nocive per le acque sotterranee. Gli allevamenti di bovini devono raccogliere le deiezioni in appositi bacini impermeabili, mentre sono proibiti gli allevamenti di suini. L'industria e l'artigianato già esistenti, inquinanti oltre il limite consentito, devono rientrare nei limiti oppure devono abolire la produzione. Il transito del petrolio, dei suoi derivati liquidi e di altre sostanze pericolose è consentito soltanto sulle strade nazionali e regionali adeguatamente protette. Nel trasporto di sostanze pericolose le ferrovie slovene devono attenersi rigorosamente alle regole vigenti per il trasporto in condizioni di sicurezza. Nella III area (destinata alla protezione delle acque sotterranee) sono permessi l'industria e l'artigianato puliti, la costruzione di abitazioni secondo certi parametri di protezione, le attività inerenti l'economia forestale, l'agricoltura e l'allevamento con degli standard di sicurezza inferiori a quelli della II area. Sono favorite attività legate allo sport e alla ricreazione. Nei magazzini di petrolio e dei suoi derivati sono permessi serbatoi dalla capienza massima di 20 m³, con un volume massimo di 100 m³ e con un'adeguata protezione contro le fuoriuscite. Sono permesse le cave se di grande importanza pubblica, mentre sono proibite altre attività minerarie. I depositi di rifiuti industriali sono permessi a condizione che rispondano alle regole di sicurezza e che i rifiuti non siano solubili in acqua. Nella IV area (destinata alla protezione del bacino imbrifero) sono permesse tutte le attività con un normale regime di protezione dell'ambiente, fatta eccezione per l'industria e l'artigianato fortemente

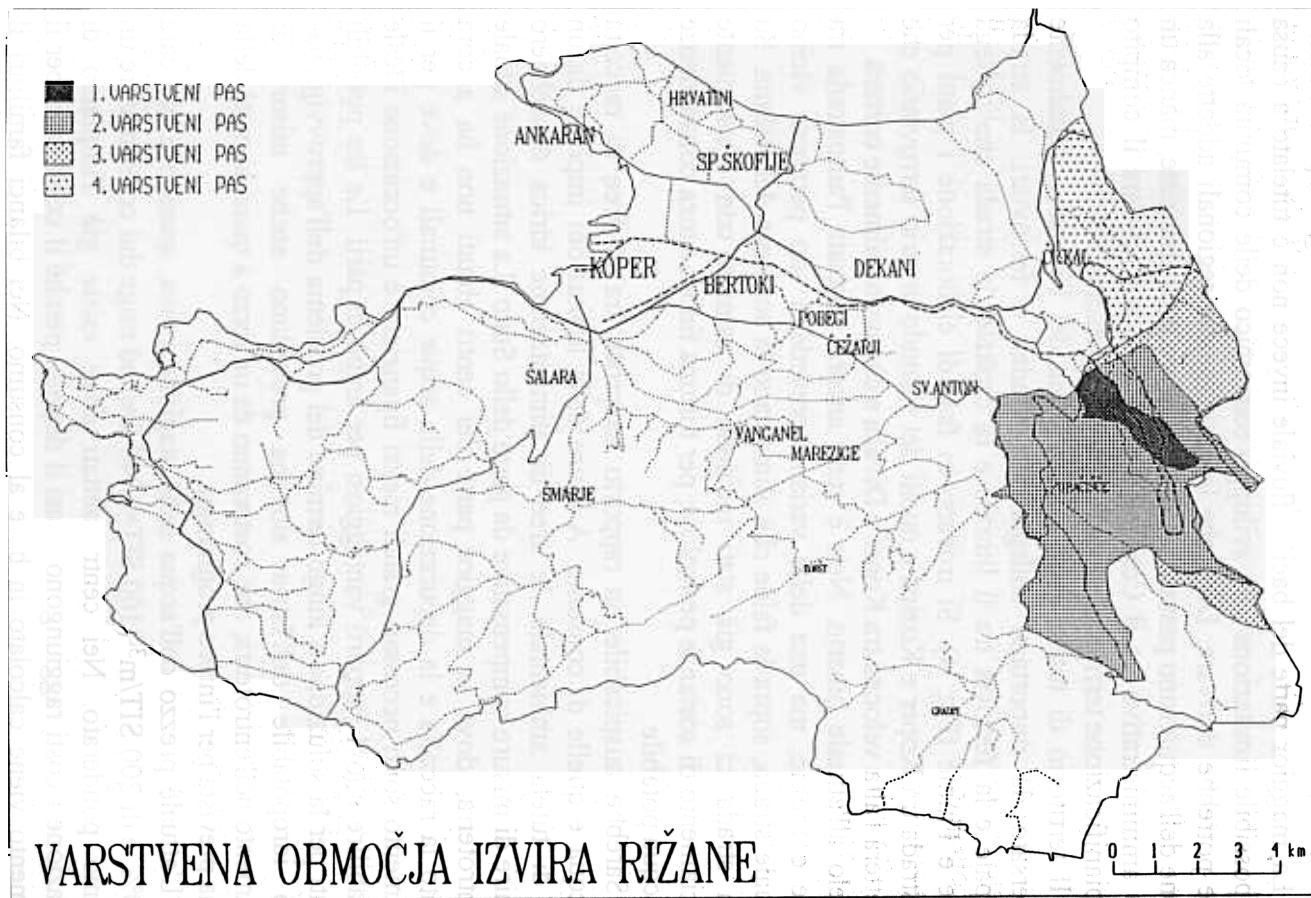


Fig. 3 - Aree di tutela della sorgente del Rižana, dalla I alla IV (cfr. testo per la spiegazione); (sono indicate anche le reti stradale e ferroviaria: cfr. Fig. 4)

inquinanti, gli allevamenti di suini ed il transito di petrolio, dei suoi derivati e di sostanze pericolose su strade che non abbiano un'adeguata protezione.

La maggior parte del bacino fluviale invece non è tutelato a causa della possibile limitazione allo sviluppo economico delle comunità locali che ne potrebbe derivare. Dato che le ex comunità regionali addette alla gestione dell'acqua sono passate sotto il Ministero per l'ambiente, manca un anello amministrativo tra il Comune e lo Stato a cui affidare il compito della pianificazione territoriale e della tutela delle risorse idriche.

Il territorio di tutela delle fonti d'acqua del Rižana è attualmente attraversato da importanti collegamenti stradali e ferroviari: la strada principale e la ferrovia tra il litorale e la capitale, la strada che collega Trieste e Fiume (Fig. 4). Si trovano in fase di elaborazione i piani per l'autostrada tra Koper e Kozina e quelli del secondo binario ferroviario che permetterà l'alta velocità tra Koper e Divača e che probabilmente correrà parallelo all'attuale binario. Non è stata ancora tracciata l'autostrada tra Trieste e Fiume, ma una delle varianti prevede il suo percorso vicino all'attuale strada, sopra le falde che alimentano la sorgente del Rižana. Su questa strada ci sono già stati incidenti di camion con conseguente rovesciamento di sostanze pericolose, per fortuna finora senza conseguenze per l'acqua potabile.

Sarebbe auspicabile un rapporto reciproco tra le aree di raccolta dell'acqua e quelle di consumo. A causa della limitazioni imposte da un piano di tutela ambientale, le aree di alimentazione idrica dovrebbero usufruire di misure compensative da parte dello Stato. La situazione attuale nell'entroterra, dove la maggior parte dei centri abitati non ha ancora regolato la raccolta e la depurazione delle acque comunali e dove per il risanamento sono necessari grandi mezzi finanziari, è un'occasione ideale per stabilire nuovi rapporti vantaggiosi per ambo le parti. Le tre possibili varianti per la soluzione a lungo termine del problema dell'approvvigionamento idropotabile dell'Istria slovena prevedono anche misure di risanamento nell'entroterra, che costeranno da un terzo a quasi la metà della somma prevista per l'intero programma.

L'attuale prezzo dell'acqua nella stagione estiva, quando è più cara del 30%, è di 200 SIT/m³ (100 SIT=1040 lire) ed esige dal consumatore un consumo ponderato. Nei centri abitati dove esiste già l'impianto di depurazione i costi raggiungono quasi il doppio, perché il contributo per il trattamento viene calcolato in base al consumo. Nei bilanci familiari il consumo dell'acqua è una voce più importante di quella di luce, telefono e



Fig. 4 - Centri abitati, rete stradale e ferroviaria.
 1. Strade locali; 2. Strade regionali; 3. Strade nazionali; 4. Ferrovia.

gas. Il prezzo dell'acqua rappresenta una voce considerevole anche per gli alberghi e gli altri impianti turistici. Esistono perciò già delle misure di risparmio idrico, nelle quali però non vengono coinvolti i turisti ospiti: sarebbe forse opportuno avvertirli che si trovano in una regione che dispone di acqua carsica di qualità, che è però un bene prezioso e sempre più raro. Questo principio si adatterebbe anche alla sensibilità crescente dei turisti per i problemi legati all'ecologia.

Del prezzo dell'acqua, il 31% va nelle casse dello stato come tassa per l'inquinamento dell'acqua. Queste risorse finanziarie vengono poi restituite ai comuni tramite il fondo per il co-finanziamento della costruzione delle infrastrutture comunali, sotto forma di crediti o finanziamenti a fondo perduto. I Comuni di Koper, Izola e Piran possono contare sull'aiuto dello Stato per la soluzione del problema dell'approvvigionamento idrico, sia per quanto riguarda il pagamento dei crediti già concessi dalle banche internazionali sia per procurarsi nuovi mezzi per gli investimenti più urgenti. Infatti, le quantità d'acqua che la Slovenia riceve dalla Croazia sono disponibili fino al 2005 ed entro quella data bisogna procurarsi nuove fonti d'approvvigionamento per sostituire l'acqua croata e per far fronte ad un prevedibile aumento del consumo.

Lo Stato raccoglie risorse finanziarie anche dalle concessioni sulle acque. Un aumento si verificherà appena verrà definito il regime delle concessioni sulla base della legge sulla tutela dell'ambiente e della legge sulle acque. Infatti oggi la maggior parte dei consumatori sfrutta l'acqua grazie a vecchi permessi che sono inadeguati alla nuova situazione, o addirittura senza alcun permesso.

In passato gli abitanti dell'Istria slovena prendevano l'acqua dai ruscelli e dalle sorgenti naturali, dai pozzi e negli ultimi trent'anni anche dalle cisterne d'acqua piovana nei centri abitati che non disponevano della rete idrica. Attualmente è collegato alla rete idrica il 98% degli abitanti o il 90% della superficie regionale (Fig. 5).

I mezzi di approvvigionamento tradizionali sono perciò spariti. Si conservano ancora le cisterne con l'acqua piovana che servono d'estate per irrigare gli orti. Le sorgenti, i pozzi e gli stagni, che nel passato erano importantissimi per l'abbigliamento del bestiame, vengono trascurati, perché il bestiame si è fortemente ridotto. Ciò comporta anche un altro atteggiamento della gente verso queste fonti: i pozzi sono spesso interrati, le sorgenti vengono inquinate dalle acque comunali o da prodotti chimici usati nell'agricoltura. Mantenerli puliti sarebbe invece importante per



Fig. 5 – Rete di approvvigionamento idrico. 1. Esistente 2. Pianificata

sopperire alla mancanza dell'acqua nei periodi di grande siccità o di un eventuale inquinamento del Rižana.

A causa dell'insufficiente canalizzazione nelle campagne, esiste un ulteriore pericolo d'inquinamento delle fonti tradizionali per l'approvvigionamento d'acqua potabile, legato al maggiore uso di prodotti chimici per la concimazione e la difesa delle colture richiesto dall'intensificazione della produzione agricola. D'altra parte, è diminuito l'inquinamento legato agli allevamenti di bestiame, come si è detto in forte calo nell'area.

La qualità dell'acqua alla sorgente del Rižana negli anni 1992 e 1993 era del secondo livello⁵. La qualità dell'acqua alla stazione di misurazione di Dekani è passata dal 3/4 livello al terzo, il che è dovuto probabilmente alla riconversione tecnologica e agli impianti di depurazione realizzati nella fabbrica "Lama".

Le gestione globale del bacino

In Slovenia non abbiamo ancora enti pubblici per la gestione dei bacini fluviali. Nel bacino del Rižana operano alcune organizzazioni che rappresentano diversi interessi e spesso non sono concordi tra loro, anzi. L'ultimo accertamento degli interessi presenti nel bacino per predisporre il coordinamento è stato fatto alla fine degli anni 80, quando sono stati redatti nel Comune i piani complessivi per quanto riguarda la gestione dell'ambiente, in accordo con le leggi vigenti. Per quanto riguarda la gestione dei bacini fluviali e delle acque in generale ci si aspetta molto dalla prevista legge sulle acque, che si trova già da parecchio tempo nella sua fase di preparazione proprio a causa del difficile coordinamento tra gli interessi economici e quelli legati alla tutela dell'ambiente.

Attualmente il maggior compito di gestione viene svolto dalla ditta Hidro, grazie alla sua lunga esperienza e ai compiti di ispezione in base alla vecchia legge sulle acque. I loro lavori nel bacino fluviale e sul mare vengono finanziati dal Ministero per l'ambiente, e in minor misura dai committenti come le Compagnie di Navigazione, il Porto di Koper e i

⁵ Le acque di superficie in Slovenia vengono classificate in quattro livelli in base alla destinazione d'uso potenziale. Il livello di maggior qualità, il primo, rappresenta l'acqua potabile che necessita di un trattamento minimo. Le acque del quarto livello sono di infima qualità e possono venir usate dopo un'accurata depurazione.

Comuni. Il Ministero per l'ambiente ha delegato la Hidro a rappresentarlo nei procedimenti amministrativi minori (permessi per le costruzioni, per i piccoli sfruttamenti d'acqua, ecc.), mentre per i procedimenti più complessi, come l'assegnazione delle grandi concessioni e i permessi per la costruzione di impianti maggiori, interviene e decide il Ministero.

L'istituzione che nel futuro si occuperà della gestione globale del bacino fluviale (il che si renderà necessario per uno sviluppo pianificato e di qualità) dovrà dapprima pensare all'elaborazione dei piani legati alla gestione e all'ambiente. Questi piani dovranno essere elaborati in conformità con i principi sullo sfruttamento economico e sulla tutela delle acque. Dovranno essere definiti:

- il possibile sfruttamento coordinato del bacino;
- il mantenimento e la regolazione del letto del fiume;
- la regolazione degli alvei torrentizi e delle zone di erosione;
- le possibilità di ritenzione delle acque di superficie per le necessità di irrigazione;
- le possibilità di aumento del flusso del fiume per far fronte alle siccità;
- la tutela e il mantenimento delle fonti d'acqua;
- la ricerca di nuove risorse;
- le attività per il risanamento ecologico;
- il risanamento delle fonti d'acqua locali;
- le condizioni nel caso di costruzione di infrastrutture (autostrada, ferrovia);
- la tutela legale di tutta la zona di raccolta dell'acqua a monte della sorgente del Rižana;
- l'attivazione del monitoraggio delle acque;
- le possibilità per la pesca;
- le possibilità per le attività ricreative vicino e sull'acqua;
- la tutela della flora, della fauna e dei biotipi acquatici.

Al processo di elaborazione e di accoglimento dei piani dovranno partecipare tutti i rappresentanti del settore, i vari gruppi d'interesse e la comunità locale. Il coordinamento degli interessi sarà sicuramente il compito più arduo che dovrà essere formalizzato anche con adeguate leggi. Il successo dipenderà in gran misura anche dalla qualità dei progetti di base interdisciplinari.

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SWEDISH WATER MANAGEMENT NETWORKS

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Parole chiave: *Gestione delle risorse idriche – Diritto dell'acqua– Svezia*

Key words: *Water resources management – Water Laws – Sweden*

'Water should be protected and preserved as a common natural resource'

(Swedish Water Law, 5th May 1983, Law 1983:291, chapter 1, §1).

Sweden is a sparsely populated country with approximately 8.8 million inhabitants living in an area of about 450,000 km², half of which is covered with forests. Sweden is also unusually well-endowed with water, with nearly 100,000 lakes which contain about 600,000 million m² of water. Households and companies consume only 4,000 million m² of water per year, which is about 0.66 percent of the available supply.

Despite this abundant supply of fresh water, or perhaps because of it, Sweden does not have any specifically formulated water policy covering both water *quality* and water *quantity*. Water *quality* is treated in a number of official documents, notably the Nature Resource Law (NRL), The Nature Protection Law (NVL), and in the associated legislation. Water quantity, and disputes over water rights, are mainly regulated in the Water Law (VL). After Sweden's entrance into the EU in January 1995, efforts to formulate a comprehensive water policy have intensified, and have resulted in the initiation of a number of governmental committees, and the publication of reports on the subject. In this article, the policy ambitions and proposed changes in Swedish water policy will be examined in the light of the on-going integration process occurring within EU member countries. It will be shown that a Europeanisation of Swedish water policy is taking place, and that the European Union's directives may, intentionally or unintentionally, be bringing about a change in the distribution of administrative power between national and sub-national levels of

government.

As a result of Sweden's membership in the European Union, Swedish water issues are currently being reconsidered in two official documents, 'A new water administration' (SOU 1997: 99) and 'Environmental co-operation in water protection' (SOU 1997:155). Although these documents are not as yet political established, they do present an indication of coming trends in Swedish water policy, and these documents, together with the proposal for a new Environmental Law, form the empirical material upon which this article is based.

Swedish Water Quality

The environmental goals of the Swedish Parliament (*Riksdag*) have focused on 14 environmental threats. Of these, four are of special relevance in water issues; these are the acidification of water and soil; eutrophication of water and nitrogen saturation of soil; inappropriate use of land and water resources for production and supply; and exploitation of land and water for housing, industry and infrastructure. Other aspects of water issues that are treated are the harmful build-up of metals in the ground and in water, and the protection of wet-lands.

Over 13,000 of Sweden's lakes are severely acidified; in the south-west of the country, where the problem is most serious, more than one lake in two has been acidified by atmospheric deposition of sulphur and nitrogen. Acidification has also hit many rivers and streams, and an estimated one in three or four is now affected. Totally, one fifth of all lakes and watercourses in Sweden have been damaged by acidification. To counteract these negative effects, lakes are being treated with lime, which can significantly reduce the effects on surface water. The overall aim is to limit acid rain to levels that do not harm nature and human health, and the goals are to reduce sulphur emissions, and to reduce nitrogen oxide emissions. However, Sweden is strongly affected by airborne emissions from elsewhere in Europe, and in order for the sulphur load to fall below the critical load, emissions of sulphur in Europe must diminish by 70% compared with 1990. Eutrophication is especially serious around towns and cities, and in agricultural districts. In lakes and seas, eutrophication causes not only algal blooms and changes in species composition, but also excessive seaweed growth and poorer water quality for swimming. In

certain extreme circumstances, toxic substances which can severely harm animals and children can be formed by rotting alga. The goals, among others, are to reduce waterborne emissions of nitrogen from human activities, and to reduce ammonia emissions.

Water quality in Sweden has, however, in some cases improved in recent years. For example, while, the summary of the proposed Environmental Code points out that "the transparency of Lake Vänern is now as good as it was at the turn of the century". Lake Vänern, which is the largest lake in Sweden, has a volume of 153km³, an average depth of 27m, and is 106m at its deepest point. As such, it comprises a veritable source of fresh-water for the south-west of Sweden, and perhaps, even for other parts of Europe in the future.

In the move towards ecological sustainability, nutrients in wastewater should be restored to the ecocycle as fertiliser on farm land [Environment, 1997 #964]. Water issues are otherwise not prominent in the Swedish Governments document on ecological sustainability [Environment, 1997 #964]; where they are mentioned, the issues are mostly concerned with the Baltic Sea, and fisheries in the sea and the largest lakes.

Environmental Legislation and Water Issues

Sweden considers itself a pioneer of environmental legislation, and a significant number of laws regulate environmental and water issues. Among the most important of these are the Nature Conservation Act (1964), that affirms that the national environment is a national asset to be protected and preserved, and that nature conservancy is both a national and local government concern. The law makes it possible to set aside various types of protected natural environments, and contains provisions to protect natural environments, plants and animals, and outdoor recreation, and to prevent littering. The Environmental Protection Act (1969) brings together a set of regulations on various kinds of environmental hazards originating from permanent facilities. The Marine Dumping Prohibition Act (1971) prohibits all waste discharges (solid, liquid or gas) from ships and other craft in Swedish territorial waters, and the Act and Ordinance on Sulphur Content in Fuel Oil (1976) is designed to limit emissions of sulphur dioxide from the combustion of heating oil and other fuels containing sulphur. The Waste Collection and Disposal Act and Cleansing Ordinance (1979) states

that waste must be managed in such a way as not to create a nuisance from the public health and environmental protection standpoint. The major law concerned with water issues is the Water Act (1983), which contains a number of regulations important to nature conservancy efforts. The Act on Chemical Products (1985) aims at preventing hazards to human health or the environment caused by chemicals. The emphasis is on the marketing of chemical products, but the Act covers all stages of a chemicals life-cycle. The Environmental Damage Act (1986) provides the possibility to demand compensation for damage or injury caused to the environment by the owner or occupant of real property. The Vehicle Emission Act (1986) and Ordinance (1987) are designed to prevent cars and other motor vehicles from causing damage to human health or to the environment due to emissions of exhaust gases and other airborne substances. The Natural Resources Act (1987) stipulates that soil, water and other elements of the physical environment must be used in ways that promote good long-term management from an ecological, social and macro-economic standpoint. Finally, Sweden's Penal Code (1962) contains penalty clauses for environmental violations and a number of other regulations for protecting the natural environment.

The Proposed EU Water Directive

Within the EU, work was under way in 1997 on the formulation of a directive for water politics that would be applicable in all member states. This ambition was not new; common water policies were first initiated in the 1970's, when they were mostly concerned with water quality - for example, the directive on surface water (75/440/EEG) and the directive on bathing water quality (76/160/EEG). A number of directives concerning emission levels were also accepted at this time, for example, the directive on dangerous substances (76/464/EEG). Changing patterns of water pollution, and increased awareness of the role of water, led to existing water directives being re-examined in the late 1980's. Flaws in existing legislation were identified, and a second round of water directives were initiated, for example the nitrate directive (91/676/EEG) and a proposal for ecological water quality. Besides these new initiatives, older directives were reviewed and improved, and in 1996 the directive on co-ordinated efforts to prevent and limit water pollution was accepted (96/61/EEG). This

second round of legislation lead to a discussion concerning a comprehensive approach to water policy, and better co-ordination of water policy was treated in a document from the Commission to the Council of Ministers and European Parliament in 1996 (KOM[96]59 final). The EU Parliament criticised this document, and it was revised in the following proposal for a directive on the creation of a common policy for water policy (KOM[97]49 final). Four goals were central in work on the directive; these were a) access to drinking water,

b) access to water for other economic purposes, c) environmental protection, and d) the prevention and minimisation of the negative effects of floods and drought.

The protection of the environment and good water quality were the main aims of the proposed directive, and these should be achieved through an administration based on watersheds, a description and assessment of these areas, control of surface and ground water, the development of a programme to achieve these aims, the creation of an administrative plan, and discussion with the public about the administrative plan. The proposed directive also contained demands on a mechanism that guarantees that water users pay the costs of their water use, co-ordination with the national authorities and the Commission so that problems are discovered, measures to deal with accidental pollution, simpler routines for reporting water issues, and the development of a common strategy to deal with pollution from substances or groups of substances.

If the directive was to be accepted in its proposed form, and if the Swedish government accepted the directive, Swedish water administration would have to be reviewed and re-organised, and a new water administration based on watershed areas would need to be constructed. In each country, watersheds would have to be identified and drainage regions created. A watershed district could in this case consist of one or more drainage areas, and coastal regions should be included in suitable watershed districts. Each country would be expected to decide on a suitable administrative structure that enabled water administration in watershed areas. This would involve stipulating the authorities responsible for the various tasks. If a watershed covered more than one member state, the administration should be co-ordinated between the countries in a common watershed district. This would be the case in the north of Sweden, where co-ordination with Finland would have to be developed. If a drainage area covered a border area with a non-member state, drainage district and

authorities should be created in co-operation with the bordering country. Co-operation between Sweden and Denmark, Finland, and Norway would in this way need to be further developed.

Proposed Changes in Swedish Water Management

The management of environmental issues in Sweden has been based on the traditional division of political power between the national level and two sub-central governmental levels. At the national level, The Ministry of the Environment (*Miljödepartementet*) is responsible for environmental matters at government level. The Ministry is responsible for nature conservancy, environmental protection, chemical control, environmental research, radiation protection, land use, and physical planning. The Ministry is also responsible for the co-ordination of environmental issues handled by other ministries. The central administrative agency for nature conservancy and environmental protection issues is the Swedish Environmental Protection Agency (*Naturvårdsverket, SEPA*) is. The Agency's main tasks are to work out goals, provide guidance, co-ordinate and monitor the environmental efforts of sectoral government agencies, as well as the regional and local authorities; to ensure the effective compilation and dissemination of environmental knowledge; to participate in international environmental protection programmes; to analyse and take the economic, legal and international aspects of environmental actions into account; and to monitor environmental interests in the enforcement of the Building and Planning Act and the Natural Resources Act (*Fact sheets on Sweden, published by the Swedish Institute, March 1996*).

The Agency has two research boards and a board responsible for monitoring changes in the environment. Among other things, the Agency is responsible for the protection of water quality, and is responsible for enforcing a number of environmental laws. It also co-ordinates the activities of other sectoral agencies involved in water issues.

A number of other organisations may also be involved in water issues in Sweden. The most important of these are The National Licensing Board for Environmental Protection (*Koncessionsnämnden för miljöskydd*), which is the central government agency that examines permit applications for the largest, most environmentally hazardous activities. The Board examines activities that come under the provisions of the Environmental Protection

Act, and can be involved in the evaluation of the effects of water projects; The National Chemicals Inspectorate (*Kemikalieinspektionen, KemI*), which is the agency responsible for enforcing the Act on Chemical Products. The Inspectorate is concerned with chemicals and pesticides, and provides guidance to local and regional environmental authorities; The National Board of Housing, Building and Planning (*Boverket*) which handles matters relating to national physical planning; The Swedish Board of Agriculture (*Jordbrukverket*) which is responsible for environmental and nature conservancy issues under the Act for the Management of Agricultural Land; The National Board of Forestry (*Skogsvårdsstyrelsen*) which is involved in land use issues; The Swedish National Board for Industrial and Technical Development (*Närings- och teknikutvecklingsverket*) may also be said to be involved in water issues, as it works to adapt Sweden's energy supply system to environmental and resource-conservation requirements; The National Radiation Protection Institute (*Strålskyddsinstitutet*) is responsible for radiation protection in connection with the production of nuclear power, and is therefore involved in water issues from the water-cooled Swedish nuclear power stations; and The National Board of Fisheries (*Fiskeristyrelsen*) monitors the environmental situation of fisheries and marine life, and participates in the Environmental Protection Agency's anti-acidification programme.

Perhaps the most important of the central agencies is, however, The Swedish Meteorological and Hydrological Institute (*Sveriges meteorologiska and hydrologiska institut, SMHI*), which gathers and stores data on national water resources. It also participates in efforts to analyse the long-distance dispersion of pollutants in the atmosphere and waterways.

At the regional level, Sweden's 24 county administrative boards (*länsstyrelse*) are responsible for environmental protection in their areas. The administrative boards are regional branches of central government, and decide issues related to environmentally hazardous activities in cases where the National Licensing Board for Environmental Protection does not have jurisdiction, and where they are responsible for supervising these activities. The boards are responsible for continuously monitoring environmental quality, for enforcing, among other things, the Act on Chemical Products, and for other tasks covered by the Building and Planning Act, the Natural Resources Act, the Water Act, the Act on Public Installations Concerning Water Supply and Sewage, and other legislation. They also make decisions regarding nature reserves, nature conservation areas, natural landmarks,

protected shoreline areas, and bird and seal sanctuaries.

At the local level, Sweden's 288 municipalities (*kommun*) play a very important role in environmental protection work today. Parliament has granted municipal governments the right to limit emissions and other environmental hazards from many other activities they were not previously allowed to influence directly, and every municipal government must see to it that industry, traffic, waste management and energy use take health and environmental considerations into account. With the instigation of work on Local Agenda 21, the *kommuns* have been given yet another role to play in environmental management.

In addition to these public agencies, there are many voluntary organisations that may be concerned with water issues and the environment; among these are the Swedish Society for Nature Conservation (*Svenska Naturskyddsföreningen*), established in 1909; World Wide Fund for Nature; the Keep Sweden Tidy Foundation; *Fältbiologerna* (a youth association for environmental studies and conservation); the Natural Step; the Swedish NGO Secretariat for Acid Rain; Greenpeace; Friends of the Earth; and the Green Party.

The Swedish government has created a number of administrative control mechanisms to manage environmental and water issues. These include legislation, review of permit applications, monitoring of environmentally hazardous activities, administrative injunctions or other sanctions. In recent years, economic control mechanisms have gained in importance. They include government grants, e.g. to develop new environmental protection technology; emission charges, e.g. on sulphur and nitrogen oxides as well as carbon dioxide; production charges, e.g. on fertilisers; taxes and refundable deposits, e.g. on beverage containers and batteries; environmental protection charges, water pollution charges; and fines and penalties for violations.

Swedish Water Management

The major law governing water issues in Sweden is the Water Law of 1983. The law is applicable to water projects and water works, and has provisions on the protection of water-supply. Water projects are defined in the law as dams, piles, the diversion of surface and ground water, and drainage; a water work is defined as a construction that is built in

connection with a water project. The Law stipulates the conditions under which water projects can be allowed, and regulates questions of compensation. The basic principle is that a permit is required for a water project; permits are not required, however, for water supplies for one- or two-family houses, nor for a farm property's household use or heating supply. They are not required for the building of works for the cultivation of fish, or for the building of works for the extraction of thermal heat. There are special conditions regarding land drainage and the dominion over water. The Water Law is mainly concerned with regulating disputes between parties in water cases, and in stipulating the rules governing the establishment of water projects; little is said about the inherent quality of water. At the permit hearing for a water project, the law [1987:139] on natural resource management should be applied. However, the government may decide to go ahead with a water project if they find that it is in the public interest.

Drainage

Land drainage projects are regulated by the Law, which also stipulates the conditions under which land owners may be obliged to participate in drainage projects. Land drainage projects may be organised as associations, and may also be concerned with the removal of sewage water and road projects. Permits for land drainage are considered at a hearing, which is administered by a referee appointed by the regional administration. The regulations regarding the authority of referees are established by the government, or by an authority delegated by the government. In certain cases, two qualified citizen may participate in the proceedings; these are chosen from among members of a real estate court or land survey proceedings. It may be decided at a hearing that a matter of land drainage should be judged according to the water law. The referee's decision is also subject to appeal, and the case will then be referred to the water court.

Irrigation

If several individuals apply for a permit for an irrigation water supply out of the same water source, they may need to form an irrigation association. The members may then distribute available water among themselves, if the distribution is consistent with the permit conditions

imposed by the water court. The irrigation associations costs for construction, administration and management are shared by the participants in relation to the amount of water that they can use. Water regulation for irrigation is also regulated by the Law. Charges are levied for the diversion of water for any other purpose than for hydro-electric power, and for surface water supply. The size of these charges is determined by the Water Courts.

Power generation

The Law stipulates how water regulation for power generation should be organised, and regulates compensation for damage caused by the construction of hydro-electric power works. Compensation is fixed in money. Community charges are levied for management of hydro-electric power plants, and may include fishing charges, which are used to promote fishing.

Protection of the water supply

The law contains regulations concerning the protection of the water supply; when surface and ground water are utilised, precautionary measures should be taken to prevent or remedy damage. In cases where surface and ground water is utilised, or can be assumed to be used for water supply, the regional administration can establish a water protection area. If necessary, the regional administration can require that signs and fences be put up to protect this water supply, and can impose requirements on public behaviour within the water protection area.

The hearing of water cases

The Law contains rules for the management of water projects. For larger water projects, the government holds the hearings; larger projects are hydro-electric power stations with a capacity over 20,000 kilowatts; water projects that will result in water level differences of more than two metres a year or one metre a week; major diversions of water; and water projects involving the most important Swedish rivers and lakes. Before a permit is sought for a larger project, the applicant must notify a number of national boards that may be affected by the project, as well as other authorities and municipalities. These municipalities, authorities and associations must then

be given the opportunity to comment the detailed plan for the project. The court of initial jurisdiction in water cases is called the water court; these are designated by the government and are at present six. The appellate court in water cases is the water Court of Appeal, Svea hovrätt. The Supreme Court is the highest court in water cases.

The water court consists of a president, a technical member and two jurymen. Technical members should have a technical education and be experienced in the handling of water cases. Jurymen should be qualified jurymen in real estate court. The president and technical member are appointed by the government, or by an authority delegated by the government. The government also decides the jurisdictional area of the water court, which should follow watersheds between different water systems. Supervision over water projects and water works is the responsibility of the regional administration.

The creation of a new Swedish water administration based on watersheds

The Swedish Government's Committee on drainage areas published a preliminary report in June 1997. In this, the creation of a new water administration based on drainage areas is proposed. The Swedish hydrological authorities have identified 119 major watersheds and about 11000 minor watersheds in Sweden. Coastal areas with direct drainage into the sea are not included in these figures. The Swedish coastal regions have been divided into 55 coastal water regions which are connected with watershed areas. The Committee proposed that Sweden should create about 10 watershed districts, which will consist of one or more watersheds, coastal areas, or coastal waters.

Although the Committee pointed out that the creation of watershed districts would not solve all water management problems, it did come down strongly on the side of this, for Sweden, new administrative form. The other problems that were mentioned included lack of necessary knowledge and economic resources. The Committee proposes that an independent body should be created by the regional authorities within each district, and that this should be responsible for watershed management. Environmental goals should be formulated for each district, and the 119 watershed authorities should be given the task of creating a plan for the achievement of

environmental norms and goals. These plans should be legally binding for the courts, municipalities, and authorities. The regional authorities that do not become responsible for watershed districts, as well as the municipalities and other organisations and private interests, should be given the possibility of influencing the work of the new authorities. The work of the new authorities should be financed through a tax on the emission of polluted water, which should be applicable to both large and small point sources, as well as to diffuse sources such as agriculture and forestry. The Commission also proposed, in its final report (SOU:1997:155) that a charge for the use of water should be established; this should also apply to the use of water for irrigation. The Committee also proposes that a charge for the use of water for power production should be introduced.

The Proposed Environmental Code (1997)

The proposed Environmental Code is to be the 'central tool of environmental policy in the task of realising a sustainable society' [Government, 1997/98 #965]. The proposed Code is intended to; strengthen protective interests; define clear objectives for environmental policy by providing new instruments, including environmental quality standards and greater scope for taking legal action against environmental offences; create general rules of consideration; and strengthen the influence of the general public. It is intended to interact with and underpin other instruments of environmental policy, and it is intended to modernise Swedish environmental law. In the Code, fifteen laws will be amalgamated into a single enactment; the laws that will be co-ordinated in the Code are:

- The Nature Conservancy Act (1964:822)
- The Environmental Protection Act (1969:387)
- The Marine Dumping Prohibition Act (1971:1154)
- The Act and Ordinance on Sulphur Content in Fuel Oil (1976:1054)
- The Agricultural land Management Act (1979:425)
- The Waste Collection and Disposal Act and Cleansing Ordinance (1979:596)
- The Health Protection Act (1982:1080)
- The Water Act (1983:291)
- The Pesticides (Spreading over Forest Land) Act (1983:428)
- The Act on Chemical Products (1985:426)

The Environmental Damage Act (1986:225)

The Natural Resources Act (1987:12)

The Biological Pesticides (Advance Testing) Act (1991:635)

The Genetically Modified Organisms Act (1993:900)

The Flora and Fauna (Measures Relating to Protected Species) Act (1994:1818)

Besides including the Water Act of 1983, the proposed Environmental Code will contain the provisions of Chapters 2 and 3 of the Natural Resources Act, and will stipulate that the conservation of water should take place in a long-term perspective based on ecocyclic principles. The Code will also include prescriptions concerning the least acceptable environmental quality of water, and may refer to the occurrence of bio-indicators in water.

The Code also stipulates that property owners can be held responsible for the investigation and after-treatment of polluted water, and for seriously polluted water to be designated an environmental risk area. If a body of water is thus designated, the county administrative board can prescribe restrictions on the use of the water. The Environmental Code will also 'supersede the Water Act insofar as the latter has a bearing on environmental issues of central importance'. The other provisions of the Water Act will be gathered outside the Environmental Code into an Act containing special provisions on water activity. The main rule will continue to be that water activity is subject to permission. The provisions of the Dumping of Waste in Water (Prohibition) Act will be incorporated into the chapter of the Environmental Code dealing with waste and producer liability, which will correspond to the rules of the Public Cleansing Act.

Changes in responsibility are also suggested in the Environmental Code; for example, while the Government shall only be concerned with the examination of more important water activities, the municipal veto which exists today in many areas of environmental issues will not apply in connection with Government examination of the permissibility of waterworks.

The Water Courts now in existence will be superseded by Regional Environmental Courts; Water Courts will therefore cease to exist. A Supreme Environmental Court will be set up and affiliated with a major Court of Appeal (Svea Court of Appeal). The Supreme Court will be the final instance for certain cases, while other authorities involved in environmental issues will be the Government, the county administrative

boards and other administrative authorities, and the municipalities. The regional environmental courts will be the courts of first instance for cases concerning water, and judgements and decisions by the regional environmental courts will be contestable by appeal to the Supreme Environmental Court. Questions concerning permits for land drainage will be examined by the county administrative board, who should refer the matter to an environmental court in certain conditions.

Supervision

Supervision of the Environmental Code will be exercised by the national authorities appointed by the Government, by the Physician General, and by the county administrative boards and municipalities. The division of responsibility between these different levels will be clearly determined.

The municipalities will be responsible for supervision of the parts of the health Protection Act, the Public Cleansing Act, the Nature Conservancy Act, the Management Act, as they have today. They will also supervise installations which do not require a permit under the Environment protection Act. The municipalities will also, in principle, be responsible for chemicals supervision at local level. The municipalities that have the necessary resources and competence should be able to take over additional supervision from the county administrative board. The issues in questions are nature conservation, environment protection supervision, the supervision of agricultural land, and the supervision of water activity. The county administrative boards will be regionally involved in co-ordination and follow-up. Certain supervision will however always be vested in the State.

Penal provisions

The penal provisions of environmental law will be gathered into a special chapter of the Environmental Code, and stricter penalties will apply to offences in the environmental sector. The scale of penalties for crimes extends in the majority of cases from fines to imprisonment for up to two years. For serious offences, the penalty can be from six months to six years imprisonment. The maximum penalty for deficient environmental information and for the deposition of litter will be one year's imprisonment. For certain minor infringements the maximum penalty stops at six months'

imprisonment. Businessmen will be charged and environmental sanction charge if they infringe on environmental rules; this charge will be at least \$650 and at most \$65000. An infringement can involve disregard of prescriptions, commencement of an activity without a necessary permit, or disregard of a permit or special conditions.

The Environmental Code will also contain certain rules on compensation for, for example, decisions concerning national parks, nature reserves, cultural reserves, biotope protection areas, and water protection areas. The Environmental Code will also make it the duty of a party who has conducted an activity since 30th June 1969 to remedy residual damage or nuisance in the environment, and to after-treat areas affected by pollution which has not ended when the Environmental Code comes into force. The environmental damage insurance system will also be expanded so as to include a decontamination insurance covering areas where the party liable lacks the capacity for after-treating contaminated areas.