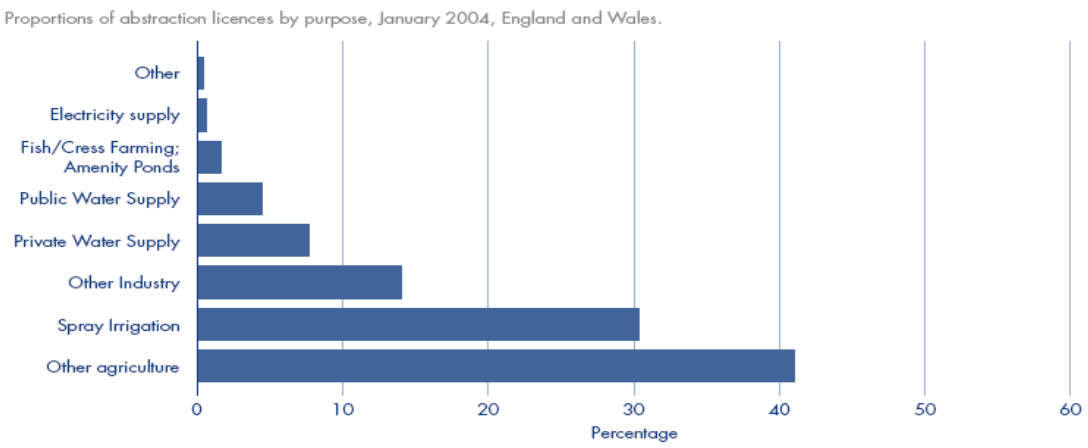
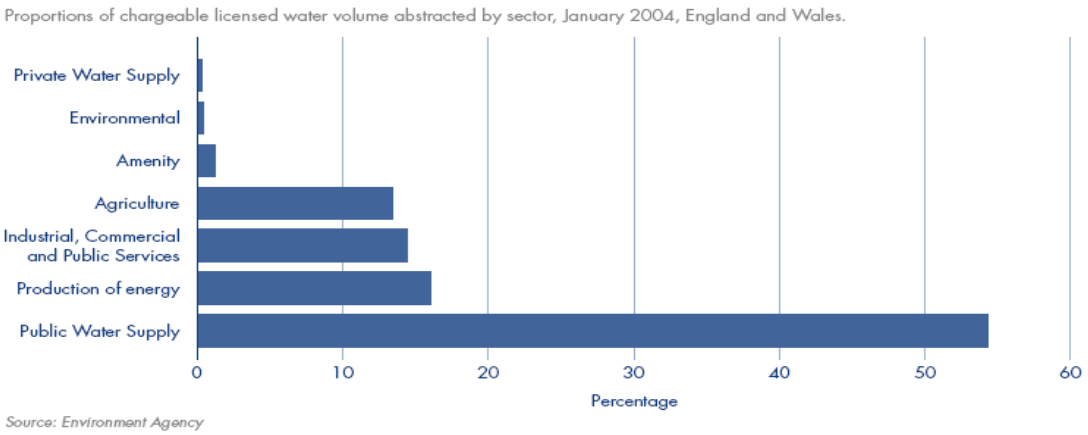
China – UK, WRDMAP
Integrated Water Resources Management Document Series

Thematic Paper 4.1: Abstraction Licensing Systems – International Experience

May 2010

4. Permitting





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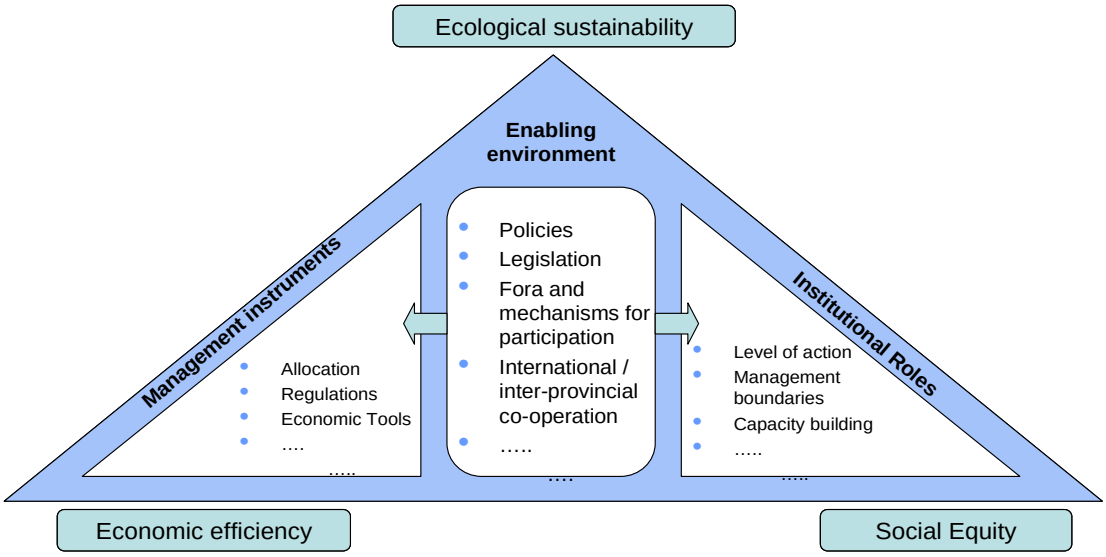
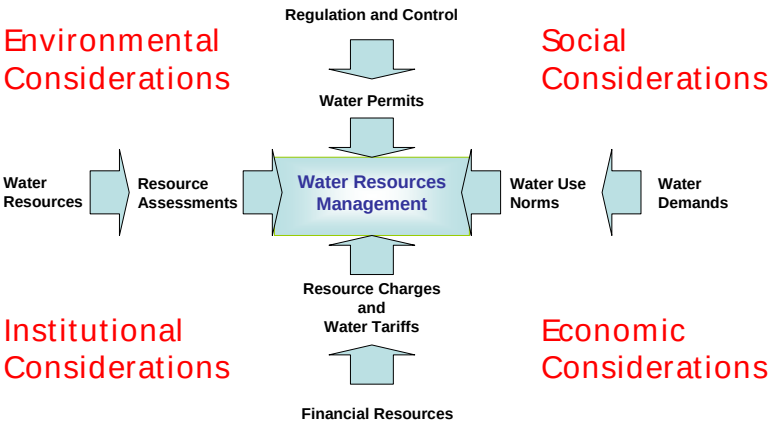
Integrated Water Resources Management (IWRM)

(Basics after Global Water Partnership)



Driving Elements of Integrated Water Resources Management



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Summary: The development of a stable system of water rights provides a **sound foundation** for the development and protection of water resources and for the conservation of aquatic ecosystems. Such a system is a basic building block in the management tools used for demand management.

At the outset it is important to note that there is no single 'best practice' model as regards the permitting of abstractions. Each country has a unique relationship with its water resources, a relationship that is shaped by a range of factors including geography, hydrology, climate, history, population size, economic development and so forth. It follows that each country's legislation in general, and approach to water allocation and permitting in particular, represents a specific response to a specific set of circumstances.

This paper describes the principal features of international best practice in abstraction permitting:

- Water Rights
- Permitting systems
- Implementation issues
- Role of permit systems in water resources management
- Conclusions

This document is one of a series covering topics on sustainable water resources planning, allocation and management. Details are given in the bibliography.

The Ministry of Water Resources have supported the Water Resources Demand Management Assistance Project (WRDMAP) to develop this series to support WRD/WAB at provincial, municipal and county levels in their efforts to achieve sustainable water use.

1 Water Rights

In a world where there are ever increasing demands on scarce fresh water resources and a growing realisation or appreciation that water is a social, economic and environmental 'good' great attention must be given to all facets of water abstraction licensing (allocation) and associated management activities. Competition among demands on fresh water resources will increase and it is only through effective abstraction licensing and use management and auditing that conflicts are going to be minimised. Water rights are the basic concept behind this process.

A water rights system should have the following key attributes:

- requirement for effective and beneficial use of water, such that water resources cannot be obtained for speculation or let run to waste
- reasonable security of water-use tenure, including entitlement to compensation under some (but not all) circumstances when reduced, notwithstanding the requirement for efficient and beneficial use
- flexibility to reallocate water to more beneficial social, economic and ecological uses, through periodic review or other mechanisms, rather than allocation in perpetuity.

A summary of the legal definition of water rights is presented in Box 1 with a description of different view points in the China water sector.

Box 1 Development of water rights

'According to international best practices, water rights should recognise both the ownership of water resources and usufructuary rights over the state-owned water resources. The usufructuary right of a water resource is a *jus in re aliena* based on state ownership of water resources, and a result of separation of ownership from the right to the use of water resources. In other words, water rights should give a right to use and a right to gain earnings from water resources. The rights embedded in water have a dual nature. On the one hand, they give to the party that controls the way the water is used the right to use and profit from the water. On the other hand, there is recognition that water is a scarce resource that is non-alienable and really part of the public trust. The party with rights over the water must therefore balance the right to use with the public trust that recognises certain social and ecological values.

In China there are mainly four schools of thought on the conceptualisation of water rights. First, there is the 'one right' viewpoint which formalises only the right to use of water resources. The 'two right' viewpoint suggests that there is not only ownership over the water, but also the right to the use of the water resources. The 'three right' viewpoint contemplates ownership, right of management and a right to use. The 'four right' viewpoint involves rights consisting of ownership, possession, control and uses of water resource. Under China's present Water Law water ownership belongs to the state and generally embraces the 'two right' approach, so present research on the establishment of water rights should emphasise the right to use water and the right to obtain profits from water. In other words, water rights include a usufructuary right that is formed by the right to use and the right to derive earnings…'

Source: 'Conceptualising the Development of Water Rights in China', Wang Rong, China University of Political Science and Law, May 2007.

A water rights system fundamentally involves identifying the total resource available for use and then assigning the 'rights' to that resource among different groups. A traditional approach to water rights is described in Box 2.

Box 2 Traditional approaches to water rights

Within the countries of the civil law tradition a distinction was generally made between public waters in respect of which a permit was necessary and the smaller streams and rivers that were classed as 'private waters' and which were classed as a form of private property. Groundwater was also classed as 'private waters' and did not require any form of permit.

Two main approaches developed within the countries of the common law tradition. Under the doctrine of riparianism, riparian land owners were entitled make 'ordinary' use of water flowing in a watercourse which notion encompassed the 'reasonable use' of that water for domestic purposes and for the watering of livestock irrespective of the impact on downstream users and other ('extra-ordinary') uses provided they substantively impact on downstream uses. Under the doctrine of prior appropriation, which was developed and still applies in the Western United States, the basic rule is that the first person to abstract water and to put it to beneficial use acquires a right to use that water. In times of water shortage older or 'senior' abstractions have priority. It should be noted that the prior appropriation doctrine continues to regulate water rights in the western United States.

In the ideal situation no water uses would be licensed, or allocated, until a good understanding of the water resources in the natural state was achieved. In reality licensing (or permitting) systems are introduced when the development of water use has grown to a point at which society is

concerned about the availability of resources for the future.

A key objective of integrated water resources management (IWRM) is to rationally allocate (and as necessary to re-allocate) finite water resources among different water users and different water use sectors.

2 Permitting Systems

2.1 Introduction

Recent years have seen reforms to water laws in many countries, including China, relating to the use of water. Well known examples include the reforms undertaken in Spain, South Africa, Australia and Mexico.

With a number of specific exceptions the traditional approaches of the principal (formal) legal traditions have generally proved inadequate to regulate increased demand for water (see Box 2). A key focus of these legal reforms has been to introduce and/or update water abstraction permitting regimes.

Sometimes, as in the case of South Africa, these reforms have introduced radically new approaches to water resources management through new permitting arrangements. Elsewhere they represent the development or continuation of reforms that begun earlier. In England, for example, reforms that began with the Water Resources Act 1963, which introduced a formal water abstraction permitting regime, were further developed in 2003 with the introduction of time limited abstraction permits.

Abstraction permits serve two main functions. On the part of society they provide a mechanism to rationally allocate water among different uses or different water use sectors - the need to allocate water in this manner becomes more important as pressure on water resources increases. From the perspective of the permit holders, provided permits are of sufficient duration, they confer the necessary security for investment in activities entailing the use of water.

Most importantly they provide an effective mechanism for ensuring the proper management of water resources. As they are legally backed, the state has an interest in ensuring that they are correctly implemented. Permit holders in turn have a genuine and actionable interest in ensuring that this happens. In other words permit holders are more likely to take steps to ensure that their legal rights to abstract and use water are respected and that the state agencies involved fulfil their legal obligations in this connection thus making compliance with the applicable legal regime more likely.

This contrasts with, for example, legal regimes that seek to govern natural resource use through short term licences that rely entirely on enforcement by the state. If for whatever reason, including a lack of resources or political will, the state fails to implement such a regime other resource users, even those who hold the necessary licences, have little interest or incentive in seeing it enforced.

2.2 Scope of an abstraction permitting regime

The scope of an abstraction permitting regime is typically somewhat broad. In other words it goes beyond the mere abstraction (and use) of water. First of all such regimes typically apply to the abstraction (and use) of both surface and groundwater. In addition a range

of other activities involving water and water courses are generally regulated either as part of an abstraction permit scheme, or at least in close co-ordination with it.

Next the impoundment of water behind a dam or other hydraulic structure, and its subsequent use (eg for hydro-power generation) is typically also regulated within the framework of a water abstraction permitting regime even though the water is not actually removed from the water course. Thereafter, depending on the specific legal rules in force in a given jurisdiction a permit may be necessary:

- to divert, restrict or alter the flow of water within a water course;
- to alter the bed, banks or characteristics of a water course, including the construction (and use) of structures on its banks and adjacent lands including those related to the use and management of water within that water course;
- to extract gravel and other minerals from water courses and the lands adjacent to them;
- to use wastewater water for irrigation;
- to undertake fishing and aquaculture activities; and
- for navigation.

Finally, the discharge of wastes or pollutants to water courses must also be regulated.

Why is this? The reason lies in the fundamental degree to which such activities are inter-connected. For example, those who abstract for irrigation or drinking purposes require relatively clean water, whereas industrial water users may be able to make do with water of a lesser quality. Consequently in authorising the discharge of wastes or effluent to a water course it is necessary to take account of other existing uses of water. At the same time the amount of water that is abstracted will affect the ability of a given water course to dilute and disperse wastes and effluent. Thus abstracted uses, particularly in times of low river flow, are likely to impact on the extent to which the discharge of wastes and effluent should be permitted.

Even when such activities are ‘non-consumptive’, in that they do not remove water from a water course they frequently still affect other water uses. For example, the impoundment of water behind a dam in order generate electricity for example or to establish a supply for other purposes, may not actually result in the removal of water from a river , the operating regime of that dam will however affect flows at different times of the year. Similarly constructions on river banks for whatever purpose may affect navigation.

And again in times of low flow depending on the particular river priority may be afforded either to navigation or to water abstraction. It follows that just as the entire range of activities involving the use of water may have a negative impact on the quantity, quality and flow of water in a given water course or aquifer, the legal rights which govern such activities will invariably also impact each other.

One means of ensuring an integrated and coordinated approach to permitting is to regulate all such activities as ‘uses’ of water on the basis of a single permitting regime. Thus article 3 of the German Water Law states:

- Within the meaning of this Law, uses are defined as:
  - the withdrawal or diversion of water from surface waters,
  - the damming or drawing-down of surface waters,
  - the withdrawal of solid material from surface waters, where this affects the properties of such waters or their flow,
  - the introduction or discharge of substances into surface waters, the introduction or discharge of substances into coastal waters,
  - the discharge of substances into the groundwater,
  - the withdrawal, conveyance to the surface or diversion of groundwater.
- The following shall also be deemed to constitute uses of water:
  - the damming, drawing-down and diversion of groundwater by means of installations that are designed or suitable for such purposes
  - any measures which are likely to cause permanent or not only inconsiderable harmful changes to the physical, chemical or biological properties of the water.

A common set of permits and permitting procedures are then applicable to all of these activities although the procedure for issuing separate permits for separate activities may vary from case to case. For a range of reasons, however, many countries distinguish between abstraction permits and discharge permits. These reasons are explored below.

Notwithstanding the broad ranges of activities that are usually regulated within or in coordination with a water abstraction permitting regime, it does not follow that all abstractions are invariably included. Typically, a range of minor activities are exempted from the requirement to obtain a permit by reference to the type of activity, the volume of water used or a combination of both.

In Spain, for example, the uses of water for drinking, bathing, and other domestic purposes as well as for livestock watering are classified as 'common uses'. In Saskatchewan Province, Canada, the exemption derives from the size of the parcel of land to be watered, while recent water law reforms in England exempt abstractions of up to 20 cubic metres per day from the abstraction permitting regime. In Ghana it is an offence to exploit or in any way use natural water resources without a permit granted by the Commission except for water use for the fighting of fire or where water is abstracted by mainly manual means.

Similarly as regards the use of groundwater, legislation typically provides that an abstraction permit is not necessary for the abstraction and use groundwater in connection with certain specified purposes provided relatively small volumes of water are used. In Australia, for example, an abstraction permit is not necessary for the abstraction and use of groundwater for stock and domestic purposes (including household garden irrigation). Such exemptions are usually justified on the basis that their use will have little impact on the total available water supply as well as the administrative

burden of seeking to regulate them. However, the sheer number of individual wells can ultimately have a significant negative impact on the quantity (and quality) of groundwater and related surface water resources.

There is no particular theoretical justification for exempting such uses from water abstraction permitting regimes. Instead, a value judgement is made by the legislature that takes account of the increased administrative and financial burden of including such uses within the formal framework, their relative value to individual users and their overall impact on the water resources balance.

Until recently the legislation of Alberta in Canada provided that riparian land holders could continue to use water for 'domestic purposes' which were defined as:

- s1(g) Household requirements, sanitation and fire prevention, the domestic watering of animals and poultry and the irrigation of a garden not exceeding one acre adjoining a dwelling house on the land of a riparian owner.

In practice this provision caused problems on stressed river systems with such riparian owners consuming the entire stream-flow. It is also difficult to quantify the quantity of water to which riparians are entitled and there were a number of exaggerated claims. The new legislation restricts such 'domestic' rights up to a limit of 1,250 cubic metres per year per household and gives such uses highest priority in times of shortage.

2.3 Legal source

The legal source for water abstraction permitting is almost invariably primary legislation. Indeed so fundamental are water abstraction permits to water resources management regimes that they typically form a central part of the applicable legislation and a key element of water legislation reforms. Such provisions are typically contained in a basic water law or water code.

This is for a number of reasons. First of all, in order to bring abstractions, and related activities, within an abstraction permitting regime it is necessary to provide in law that the undertaking of such an activity without a permit will be an offence under either criminal or administrative law and punished accordingly. This can best be done through primary legislation.

Furthermore, as they are intended to create valuable rights that can bind the conduct of state agencies and third parties rights it is necessary for these to be set out in primary legislation.

Consequently the following issues relating specifically to permitting are typically set out in law:

- the circumstances in which a permit must be obtained;
- the basic function of a permit;
- the basic procedure whereby an application for a permit is to be made;
- the minimum contents of a permit including the duration.

Of course there is always a balance to be struck as to the degree of detail to be included in primary legislation and the detailed provisions relating to water abstraction permitting that are best contained in regulations (subordinate legislation). It is usually neither appropriate nor practical to include excessive level of detail with regard to an abstraction permitting in primary legislation.

2.4 Legal status and duration of abstraction permits

What, then, is the legal status or effect of abstraction permits? The key point to note is that they create legal rights to abstract and/or use water: they are created pursuant to a country's formal legal system and thus they have legal consequences. This means that they are capable of being asserted against the state and third parties. This typically means that water that is subject to an abstraction permit cannot be re-allocated to another person.

In England, for example, the permitting agency may not to grant a new permit that would permit an abstraction that would derogate from an existing protected right. If the permitting agency breaches this duty then it has to pay compensation. Such compensation is payable irrespective of proof of negligence on the part of the authority – it is sufficient to prove that the licensing authority has in fact allowed an abstraction that has adversely affected the claimant's protected right. However the minister can over-rule this instruction and compensation, which may be from central funds, will be payable.

In the case of a dispute, a permit holder can legitimately expect that the rights created by his permit to be upheld by a court and as necessary enforced through the machinery and coercive power of the state. Loss of, or damage to the legal rights created by an abstraction permit is prima facie subject to the payment of compensation and the right to such compensation is enforceable in the courts.

As such providing permits are sufficiently secure and for an adequate duration the legal rights that are created by abstraction permits are analogous to a kind of property right like lease rights or use rights over land. Indeed in some jurisdictions, the legislation even permits the sale of the 'water rights' that are created by abstraction permits.

Of course all abstraction permits suffer from an inherent degree of uncertainty. Evidently each permit can only be exercised to the extent that there is sufficient water present in the source, and the probability of an entitlement being met at all times and, eventually, the security and dependability of an abstraction will tend to increase with flow regulation.

The duration of abstraction permits has a major impact on the issue of security. Short term rights of only two or three years duration provide little opportunity to recoup investment costs. On the other hand abstraction permits do not have to be perpetual in order to confer adequate legal security. While abstraction permits' of indefinite duration do exist in a number of jurisdictions, including Chile and Colorado, the general trend is clearly towards time limited abstraction permits.

The reason for setting rights with a fixed term is to maintain sufficient flexibility to re-allocate water in accordance with future needs. The key issue for policy makers is to strike an appropriate balance between the security needed to encourage investment and the need for flexibility as regards future allocations of water. Too long a period and future re-allocation of water resources is exceedingly difficult and expensive.

Nevertheless it is the desire to maintain flexibility with regard to future water needs that has led most jurisdictions to limit the duration of

abstraction permits. Typically abstraction permits last for 10-20 years in respect of ordinary activities. Thus in the Australian State of Queensland water rights last for 10 years subject to ten yearly reviews while in England, following recent amendments to the legislation new abstraction permits are usually to a term of 12 years. What happens at the end of the initial period? Guidance issued by the permitting agency in England indicates that there is a presumption that permits will be renewed, although each permit holder will need to re-apply for the permit demonstrating that the water is still needed, that it has been used efficiently. The environmental impacts will also be considered.

In some jurisdictions, however, a longer duration is provided for in the case of major investments such as the construction of a new hydro-power dam. In Spain for example a long term permit may not exceed 75 years while in Mexico the maximum duration is 50 years and up to 40 years in South Africa.

2.5 Application procedure

The application procedure for water abstraction permits is usually spelt out in primary legislation amplified as necessary by regulations. Such procedures typically provide for:

- the making of a written application accompanied by specified documentation (such as a plan) and, depending on the size and nature of the proposed use an environmental impact assessment. Such applications are usually required to be made in a standard form;
- the payment of an application fee;
- an inspection by the permitting agency;
- the publication of the application in a local or national newspaper. Sometimes those directly affected such as right holders are to be notified individually. In England such notices must be published for a 28 day period;
- a period during which objections may be filed by third parties (such as existing water users who may fear that their rights may be adversely affected by the proposed use or environmental non-governmental organisations concerned, for example, by the negative environmental impacts of a proposed use of water);
- a review of the application by the permitting agency, and the holding of a public hearing if appropriate; and
- a decision.

The first question is who can apply for an abstraction permit? In many jurisdictions it is now no longer necessary to be a riparian land owner in order to make such an application. Instead, it is sufficient simply to provide evidence that the applicant has some form of access right to the water resource that the application relates to.

2.6 Determination of permit applications

The next question that arises is how decisions are made in respect of abstraction permit applications. In other words how are water abstraction permits allocated? To ensure that such decisions are not made on an arbitrary basis by the permitting agency, modern water legislation typically requires the use of one or more mechanisms to promote rational,

transparent, fair and effective decision making. As abstraction permits are concerned primarily with issues of quantity or the volume of water that may be impounded or abstracted it follows that permitting and the decision making process will be primarily focussed on the river or river basin in question. In other words:

Plans

Planning is probably the most significant mechanism for decision making. Water legislation increasingly requires the preparation and periodic revision of river basin plans. In France, for example, the 1992 Water Act introduced a complex water resources planning system based on General Water Plans ('Schémas directeur d'aménagement de gestion des eaux') covering one or more basins and Detailed Water Plans ('Schémas d'aménagement et de gestion des eaux') covering one or more sub-basins (or an aquifer).

Other jurisdictions whose legislation requires the preparation of plans include Spain 1985, Italy 1989, Morocco 1995, South Africa 1998, Uganda 1995, South Australia (Australia) 1997 and Texas (USA) 1997.

Furthermore, the EU Water Framework Directive means that the preparation and periodic review of River Basin Management Plans is mandatory for EU Member States.

Typically, the legislation also specifies the minimum content of such plans. For example the minimum contents of Spain's National Water Plan are specified in the Water Law. The Plan must include:

- measures necessary for the co-ordination of the basin plans;
- preferred option to possible alternatives regarding the above;
- plans and conditions for inter-basin transfer;
- any foreseen changes in the uses of the resource which may affect existing uses for the supply of towns or irrigation.

The purpose of such plans goes beyond the allocation of water abstraction permits. They may set development and management priorities and increasingly a key concern is to strike an appropriate balance between the needs of societies to use water and the protection of the environment.

A key point to emphasize is that the process of planning is often as important as the plans themselves. It is by involving stakeholders, including abstraction permit holders, in the planning process that plans acquire the legitimacy that results in their general acceptance and in compliance with whatever legal and regulatory instruments that are subsequently adopted for their implementation.

Priorities

Plans often also play an important role in setting priorities for the use of water and thus the issue of abstraction permits. The Spanish Water Law, for example, states that priorities are to be determined the relevant 'Basin Hydrological Plan'. In the absence of such plans, however, the law specifies that the priorities should be: 1) drinking water supply; 2) irrigation of land and agricultural uses; 3) industrial uses for electricity production; 4) other industrial uses; 5) aquaculture; 6) recreational uses; 7) navigation and water transportation; and 8) other uses. In the event that two applicants are competing for the same water

resources, the permitting agency is bound to have regard to and apply the relevant priorities for water use.

In some jurisdictions priorities themselves are set out in water legislation. The problem with that approach is its inflexibility. Changes in perceptions of priority cannot be accommodated without a change to the law.

In order to ensure both support for such types of plan as well as to ensure that key interests are not omitted during the course of their preparation, as described above, modern water legislation typically provides for the creation of various basin or sub-basin level fora, such as basin councils or committees, in which stakeholders can participate in their development and or review. Sometimes such bodies hold additional functions such as determining applications for particular categories of abstraction permit.

Environmental and other requirements

These may be procedural, such as a requirement for an environmental impact assessment, or substantive by reserving a quantity of water for environmental ends or by specifying how natural habitats and ecosystems are to be protected.

Furthermore, an environmental impact assessment is increasingly necessary in respect of abstraction permit applications either as part of an overall development or in connection with the individual permit application.

A range of other statutory tests may be provided for in law. Thus in New Zealand the permitting agency must consider 'any actual or potential effects on the environment of allowing the activity'. In South Africa the permitting agency is required to address a broader range of considerations in determining applications for abstraction permits, including the need to redress the results of past racial and gender discrimination, the efficient and beneficial use of water in the public interest and the strategic importance of the water in question.

Increasingly water legislation requires the setting of statutory minimum flow requirements for rivers from which no derogation is permitted. In Mexico for example a minimum stream-flow must be established for rivers pursuant to the National Water Law of 1992. Similar provisions are found in the legislation of France, and Spain.

A similar effect can be achieve through the establishment of water 'reserves', whereby specified volumes of water are set aside for priority purposes, including environmental needs as in the case in Jamaica, Mexico, Victoria (Australia) and Armenia. In South Africa a 'Reserve', which is defined to be 'the quantity and quality of water required to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource' must be determined for all or part of each water course.

The net effect of these kinds of provision is that environmental issues become a key factor in determining abstraction permit applications. In England, for example, the permitting agency prepares a Catchment Abstraction Management Strategy (CAMS) for each sub-basin in order to ensure that the water needs of riverine ecologies are safeguarded. In general terms water is allocated for abstraction on a 'first come first served basis' but only if these needs can be satisfied.

Indeed environmental legislation concerned with conservation of biodiversity and natural habitats plays an increasingly important role in water abstraction permit applications. Within the EU, for example, the Member States are required pursuant to the Habitats Directive to identify and protect natural sites with particular important biodiversity. Abstraction authorisations may not detract from these.

Similarly in the United States the Federal Endangered Species Act, which seeks to protect the habitats of inter alia aquatic endangered species, has had the affect of restricting reducing volumes of water available for abstraction resulting in some cases to reductions in permitted volumes.

In other words through such approaches environmental protection measures that are concerned primarily with the protection of rare and valuable aquatic species and habitats have a direct impact on the volumes of water that can be allocated and thus on the content of abstraction permits.

2.7 Abstraction permit conditions

Abstraction permits are invariably subject to a range of conditions that are both general and specific. Breach of such conditions usually has legal consequences which may include enforcement action pursuant to criminal or administrative law or the temporary suspension of even the cancellation of the abstraction permit.

Volume that may be abstracted or impounded

Probably the most important specific condition concerns the volume of water that may be abstracted/impounded and used. Typically if the flow of water in a watercourse is regulated (by a dam or a weir) an abstraction permit specifies the volume of water that may be abstracted and/or used. Most rivers, however, are not regulated and the volume of water available for abstraction varies from year to year depending on the availability of water resources. Similar variations may exist with regard to the volume of water that is contained in aquifers.

If the flow is not regulated then an abstraction permit will specify a fraction of the flow that may be abstracted by reference to the overall flow rate of the water course. In the Australian states of Victoria, New South Wales and Queensland, for example, annual allocations are announced each year as a proportion of each entitlement. In other words the legal right to abstract and use water is made up effectively of two separate components. This proportion can vary significantly from year to year and from to state to state depending on the legacy of past allocation policies and from resource to resource depending on availability during each irrigation season.

In Chile, although the law defines water use rights as a volume of flow per unit of time, in practice rights are a share of stream flows, since variability renders the volumetric/time specification impractical. Similarly in Mexico while abstraction permits are technically specified in volumetric terms, rather than in proportion to the stream flow, in practice the allocation of stream-flow converts this volumetric flow to a proportion of stream-flow right.

General conditions

General conditions, which are usually set out in primary or secondary legislation, typically apply to all abstraction permits within a jurisdiction

or which relate to a particular water body or a particular type of water use. For example abstraction permits relating to the agricultural use of water may be subject to a general condition that may not apply to the use of water for, say, hydropower generation.

Examples of general conditions include the following:

1. To pay fees relating to the abstraction permit

Conditions requiring the payment of water use fees give effect to the 'user pays principle'. They can also be a useful source of revenue for the state in general and the permitting agency in particular. Criteria for the setting of the rate of charges vary and include:

- the volume of water abstracted, the area in which it is used and source from where the abstraction takes place (France and Arizona);
- the volume of water abstracted (Victoria, Australia);
- the kind of use to which the water is put and the source of the abstraction (Germany);
- the type of source from which the water is abstracted (the Netherlands);
- the 'profit' made by the water user (Spain) ;
- the administrative costs of the permitting agency relating to the issue and management of water abstraction permits (England); and
- the kind of use to which abstracted water is put (Italy and Mexico).

Prompt payment of such charges is usually a condition of an abstraction permit and non-compliance with such a condition may lead to the right being suspended or cancelled. The payment of fees or charges may also be prescribed in connection with applications to the permitting agency for new abstraction permits or the modification of existing abstraction permits.

2. To make use of the water that is subject to the abstraction permit

This kind of condition is almost a standard feature of abstraction permits. The effect is that a failure to use the water that is subject to the right for a specified period, say three years, may lead to the right being forfeited. Examples include the German Water Law as amended on 23 September 1986 and the Spanish Water Law of 1985 (as amended).

Indeed, in those jurisdictions in which the 'prior appropriation' doctrine applies the fact of use is not itself sufficient: the water that is subject to the right must be put to 'effective and beneficial use'. The objective of this kind of condition is to allay concerns over the risks of speculation and the 'hoarding' of rights to water resources.

3. To use the water for the purpose for which it was allocated

Such a purpose will usually be specified as a special condition to each abstraction permit. The use of this kind of condition enables the allocation of water between different water user sectors in accordance with an agreed water resources plan.

4. To measure the volume of water that is abstracted and/or used

This type of condition is also commonly found in modern water legislation. Its purpose is to assist in the monitoring of water use by the

permitting agency. As such it is a form of self monitoring. An associated condition, which may be impliedly or expressly stated, is that such information is to be transmitted to the permitting agency.

5. To take measures to protect water resources

Such conditions are typically found in connection with rights to groundwater, for example by restricting or prohibiting specified activities near the well head or borehole so as to prevent contamination of the aquifer.

6. To treat any waste water prior to its discharge

Again the particular type of treatment that is to be used, and any parameters for the quality of the waste water that is discharged, will usually be set out as a specific condition to each abstraction permit.

7. To return unused or excess water to the water course from which it was abstracted.

In many cases the same volume of water may be used by more than one user, for example where excess irrigation water returns to the water course from which it was extracted. Such flows can be a valuable source of water. In California and Colorado under the prior appropriation doctrine downstream rights-holders can appropriate and therefore lay legal claim to such return flows, provided they can demonstrate that the return flows are put to a beneficial use and that the upstream rights holders would not be injured by the appropriation. Once constituted, such rights create an obligation on upstream water users to undertake their activities in such a manner as to ensure that the downstream right holders are not harmed. Thus an upstream right holder would not be entitled to transfer his/her abstraction permit, or to increase the efficiency of his/her use of water, in such as a manner as to reduce the volume of return flows and thus downstream water rights (held on the basis of abstraction permits).

Specific conditions

Such conditions are, as their name suggests, specific to each individual abstraction permit and are spelt out in the permit document itself. Such conditions form an integral part of the water abstraction permit itself and allow the permitting agency to exercise a relatively high degree of control over how the water is used.

While each right holder will usually be required to maintain a record of the volume of water used or abstracted as a condition of his/her abstraction permit, the accuracy of such records must be routinely verified by the permitting agency through physical inspections. Particularly in times of drought, when pressure on water resources is likely to be at its highest, the temptation to ‘cheat’, to abstract more than permitted by the abstraction permit or any restriction placed upon it is likely to be at its greatest.

It follows from the above that the correct monitoring of river or aquifer flows or storage by the permitting agency is in fact a key contributing factor to the effective administration of a water abstraction permit regime. Without careful monitoring of natural flows and the level of abstractions by abstraction permit holders the security offered by abstraction permits is lost.

A number of such permit conditions may concern land. It is, for example, common for a condition to specify the point on land at which water is to be

abstracted. This may be a point on the banks of a river or a specific location above an aquifer.

Elsewhere, such as under the new water rights regime in New South Wales, this matter is addressed by way of a description of the 'nominated works', the structures or equipment through which the water that is subject to the permit is to be abstracted.

Another condition typically concerns the point at which any water is to be returned to a surface water body. Other conditions on the return flow may also be included as well as conditions that specify the land on which the water is to be used. In other words such a condition specifies that the water subject to the permit may be used only on or in connection with a specific parcel of land. Another example of a specific condition is one that indicates the use to which the water is to be put, as is the case in California and Colorado.

As already mentioned, Chilean water rights are not subject to any conditions and abstraction permits in New South Wales do not specify the use to which the water that is subject to the permit is to be put.

Other examples of specific conditions include those that specify how the water is to be used (for example for spray irrigation as opposed to surface (flood) irrigation), the time or periods in which the right may be exercised and any variations in the volume that may be abstracted as well as how wastewater is to be treated. In England, for example, following recent legal reforms each (new) abstraction permit contains a 'Hands-Off Flow' condition that specifies the point at which abstraction must cease as a result of river flow or level of the river dropping off.

If properly applied, specific conditions have the effect of making each water abstraction permit separate and uniquely adapted to the resource to which it relates. In other words it is through the use of conditions that the general provisions of a river basin plan, water use priorities or environmental or other objectives are translated into a binding set of rules that apply to each abstraction and/or use of water.

2.8 Permit registers

Once allocated, details of abstraction permits are usually recorded in official registers maintained by the permitting agency.

Article 30 of Mexico's National Water Law, for example, requires the permitting agency to maintain a 'Public Registry of Water Rights'. Typically it is such a register, and not the individual (paper) permit that is conclusive as to the existence and scope of each abstraction permit.

In South Australia, for example, every matter relating to an abstraction permit (such as a variation) that is required to be included in the register (a) has no effect unless it is so recorded, and (b) takes effect only after it has been recorded.

Not only do such registers provide legal certainty as to the content of abstraction permits they are also an important means of ensuring that abstraction permitting regimes are operated in a transparent manner. In England, for example, the water law specifies that the contents of abstraction permit registers must be available for inspection by the public at all reasonable hours.

2.9 Suspension / modification

It is important to distinguish between the temporary and permanent suspension or modification of abstraction permits that modern water legislation typically provides for. Temporary modifications, such as the implementation of the 'Hands-Off Flow' conditions contained in English abstraction permits described above, apply typically in times of drought or water shortage.

The permanent modification or even revocation of abstraction permits typically takes place only in somewhat exceptional circumstances and on the basis of relatively narrow conditions set out in water legislation. A key distinction that must be made is whether or not compensation is payable. In general terms compensation will not be payable if the modification or revocation of the permit arises out of some kind of fault on the part of the permit holder, such as persistent non-compliance with permit conditions or an unreasonable or unjustified failure to use the water for a specified period. In the latter case the modification or revocation of the permit will operate as a kind of sanction.

On the other hand compensation will typically be payable in those cases where it is necessary to re-allocate the water that is subject to the permit for some public interest reason such as the need to guarantee an important public water supply. The fact that abstraction permits can be revoked in this manner does not detract from the property like nature of the rights they create. After all property rights relating to land can invariably be revoked, in accordance with the law, where it is necessary for the state or some other public agency to acquire the land for some public interest reason, subject to the payment of compensation.

2.10 Inspection and enforcement

It is important to note that the issue of abstraction permits is really only the start of the process as far as permitting is concerned. In order for them to be effective it is necessary for the water administration to take active inspection and, if necessary, enforcement measures.

The inclusion within permits of robust conditions on self-monitoring and self-reporting are obviously important, but so are routine inspections to ensure strict compliance with permit conditions. In order for such inspections to take place effectively it is necessary for the relevant legislation to confer the necessary powers on official inspectors to have legal rights of access to the land to which the permit relates at any reasonable time as well as to any buildings or structures. Similarly the law must impose a clear duty on permit holders to comply with such inspection activities and to provide such information, data or documentation to inspectors as may be requested.

In order to ensure compliance, failure to comply with the basic requirement to obtain a permit, the conditions of a permit, and any subsequent inspection activity must be subject to sanctions. Such sanctions, must in turn, be sufficiently onerous to provide the necessary incentive for compliance.

While a range of sanctions are typically provided for in legislation in connection with permitting offences two basic approaches to punishing offences can be detected. In some jurisdictions permit and related offences are

punished in accordance with criminal law. Elsewhere offences are invariably punished as administrative offences with fines typically being imposed directly by the administration.

Even if permit related offences are prosecuted under criminal law, however the legislation typically makes provision for administrative sanctions for non-compliance including the revocation or suspension of permits.

3 Implementation Issues

3.1 Introduction

The examples given in Section 2 relate primarily to well-established systems in Europe, North America and Australia. It is however useful to note progress in the use of abstraction permit systems as a tool for water resources management in countries where this is a more recent innovation.

In the face of rapid economic development there is a growing awareness that too little attention has been paid to the sustainability of various water developments. Organisations introducing and maintaining permit systems have a very important role to play in raising the profile of sustainability right across society from politicians and opinion formers to poor communities (Box 3).

A 2007 assessment of water rights and permitting/allocation issues in Vietnam three years after the introduction of a permitting system identified the key issues as largely institutional as the new processes became established.

Box 3 The main challenge to water resources allocation and use in Vietnam

'Establishing a sustainable level of water extraction from rivers and aquifers by providing a proper environmental share is fundamental for the future, particularly for the poorer communities who depend so much on those water sources. ….With greater levels of economic activity depending on access to a reliable water supply, competition for and conflicts over water in the dry times will only increase. Defining the shares in the dry season flows (including those for the environment and water for living) and then distributing those to competing users will be critical'.

Nguyen Thai Lai, Director General Department of Water Resources Management and Asian Development Bank 'Water Champion'

3.2 Institutional issues

Institutional arrangements

Cross-sectoral cooperation is a prerequisite of successful water resources management and permit system operation. This includes cooperation between government departments at all levels. Occasionally the legal framework and the mandates of different organisations militate against the necessary cooperation.

Secondary legislation in the form of regulations is often incomplete, contradictory, and un-enforced.

Capacity

Adequate capacity in the organisation tasked with establishing and maintaining a national water rights system is fundamental to success. A shortfall in **staff** and/or **budget** hinders effective permit management and enforcement of permit conditions. The capacity required is dependent on the design of the abstraction permitting

system including the anticipated number and type of permits at full implementation – which in turn should be appropriate to the water management issues faced.

In the Philippines the 1976 Water Code's enforcement has been held back by a lack of public awareness and the National Water Resources Board's (NWRB) modest financial and human resources. The NWRB has, because of its limited resources, to prioritize areas where there are water scarcity and high density population issues. There is a recognised need to strengthen the capacity of its deputised agents at provincial level in order to increase uptake - more dynamic provincial NWRB agents would make the water permit application process easier for water users in remoter areas.

Governance

In systems where permits are assessed, issued, and enforced at local level there is always a risk of 'capture' of the process by powerful local interests. At times of rapid economic development and urban expansion to maximise the gains from water developments it is important to make regulatory and legal requirements clear and transparent.

3.3 Technical information

Lack of information is also a key issue for successful implementation of a water access rights system.

Technical measurements of water flows may be nonexistent, secret, or so inaccurate as to be useless. This makes it hard to establish a basis for issuing rights. Better measurement supports more transparent governance but even where technically feasible may be very costly to achieve.

Environmental shares now have recognition in many licensing systems but there is generally very little good scientific information on which to assess the environmental needs.

In Vietnam a lack of technical guidance for implementing allocation of water rights has been identified as a shortcoming. Guidance is needed to ensure consistent procedures and a strategic approach to resource management. Without strong guidelines staff may be too liberal in giving permits leading to an over-licensed or allocated resource.

3.4 Awareness of Water Rights

Influencing uptake

The Philippines' 1976 Water Code explicitly says that all water - from under the ground or flowing in rivers - is owned and protected by the government, and that water users need to secure a permit to use natural water resources. Yet 40 years on many people still extract surface and groundwater at will because they don't know that they need permits to do so.

A basic problem is that the people generally see water as a free and abundant product - nature's gift. Water management agencies have to work hard to change that perception.

NWRB Executive Director Ramon Alikpala says, "Many people don't realise that getting their water permit not only means securing their water rights. It also means we can allocate water more effectively to different water users and maintain ecological balance."

Governance

Water users may have little knowledge of the laws and regulations that define formal water rights.

A water rights system can only function if rights holders are capable of protecting their rights. Legal empowerment approaches illustrate ways to go beyond conventional "rule of law" efforts, for example developing regulations, administrative procedures and courts, to also emphasise engaging people, particularly poor people, in education and capacity building so they can act more effectively to seek justice and better governance. Educational efforts, sometimes referred to as legal literacy, can improve awareness not just of rules and regulations but also of who to see and what to do in the case of problems.

4 Role of Abstraction Permit Systems in Water Resources Management

4.1 General

Abstraction permit systems are important tools in integrated water resources management (IWRM). Increasingly permit systems are being employed to protect the environment both by establishing environmental water rights or reserve, and by setting constraints on the activities of abstractors. By defining the water available to different parties, a water rights system sets a limit – a **cap** – on the total water available for use. This cap can be set at a level to ensure water abstraction is at an ecologically sustainable level.

Information obtained through the permit application process (accurate location of the abstraction point, design capacity of any infrastructure, etc), and forwarding of water use data by the permit holder as a condition of his permit, provides the water resources management agency with much valuable information with which to monitor overall resource development and status.

Referring back to Section 2.6, the process set out for determining applications to abstract is related to **plans, priorities, and environmental requirements**. This component of the permitting system is the key link to IWRM planning and implementation.

4.2 Abstraction management strategies

The assessment of the **sustainable level** for abstractions is an integral part of the IWRM process and the foundation for the determination of permit applications. Long term water resources management needs a flexible process for developing abstraction management strategies in order to:

- identify and manage arising **threats** to the supply and quality of water for urban centres, or agriculture or industry or rivers and aquifers;
- exploit emerging **opportunities** to improve water security and/or the health of rivers and aquifers; and
- communicate to users what their water situation looks like over the long-term, and actions they can take to improve it.

When new challenges (threats or opportunities) arise the strategy may need to be revised, or new strategies developed.

Most water resources management planning is based on fixed time horizons, ie the plans are time bound. In the state of Victoria, Australia, 'Sustainable Water Strategies' are developed with planning horizons of 15 years or more, however, they are flexible instruments which can be revised or replaced after shorter intervals. These strategies may direct the development of further shorter term management plans for sensitive unregulated rivers (Stream Flow Management Plans) or over-allocated aquifers (Groundwater Management Plans). The overall planning framework is intended to use an adaptive management approach responding to new and better information and community expectations.

In England the 'Catchment Abstraction Management Strategy' (CAMS) process (Figure 1) is a 6-year cycle of assessment undertaken by the Environment Agency (EA).

The CAMS process is coordinated with other IWRM activities such as the Water Framework Directive's River Basin Management Plan process, which has a focus on water quality aspects and thus provides a link between abstraction and discharge permit systems. The Water Framework Directive planning process is also run on a 6-year cycle.

By providing an indication of the availability of water resources within river catchments, CAMS highlight any areas where future resource development may take place. They also identify any areas where current levels of licensed abstraction exceed the resources available. Where this is the case, CAMS allow the issue of how to regain a sustainable level of abstraction to be discussed, and to identify mechanisms for this to be achieved.

For the resource assessment within CAMS, the catchment areas are divided into **water resource management units**. The units are defined as river reaches or groundwater areas, and they represent zones that will be treated as homogeneous for management purposes, ie permit management strategies can vary between water resource management units, but not within a unit.

Outline contents list for a CAMS document showing licensing strategies by management unit

Catchment Abstraction Management Strategy

Foreword

1. Introduction
2. Consultation process
3. The CAMS area
4. Resource balance and resource availability status
5. Licensing strategy
   - 5.1 Catchment overview of licensing strategy
   - 5.2 Water resource management unit X ("Water available")
     - 5.2.1 Resource availability status and results of the sustainability appraisal
     - 5.2.2 Guidance on the assessment of new applications
     - 5.2.3 Management of existing licenses and renewals
   - 5.3 Water resource management unit X ("Over-abstracted" or "Over-licensed")
     - 5.3.1 Resource availability status and results of the sustainability appraisal
     - 5.3.2 Guidance on the assessment of new applications – presumption against the granting of new licenses
     - 5.3.3 Management of existing licenses and renewals
     - 5.3.4 Resource recovery strategy and other changes to existing licenses
6. Post-CAMS appraisal

Consultation is an integral part of the CAMS process (see Figure 1). There is a pre-consultation period involving key stakeholders during the early stages of CAMS development. This ensures that all issues and water needs are identified, and raises awareness of the formal consultation exercise. Once the resource assessment is complete, a consultation document forms the basis for a period of formal consultation. The final CAMS document should therefore have stakeholder acceptance – this is particularly important where action is required to progressively reduce abstraction to sustainable levels.

The EA has developed a series of guiding principles that define their approach to resource management. These principles are to:

- secure the proper use of water resources for all purposes, including environmental need;
- protect the environment by:
  - identifying a minimum flow or groundwater level below which abstraction may be curtailed or augmented;
  - protecting flow and level variability across the full range of regimes from low to high conditions;
  - protecting the critical aspects of the water environment including, where relevant, habitats that are dependent upon river flows or water levels;
  - recognising that some watercourses or wetlands are more sensitive than others to the impact of flow or level changes;
- ensure no derogation of existing protected rights;
- protect other legitimate river users' interests;
- be able to incorporate existing and future local requirements such as flows to estuaries;
- take account of water quality considerations throughout the catchment in both surface waters and groundwater.

A classification system has been developed to provide information on the availability of water resources in a management unit. This "resource availability status" indicates the relative balance between committed and available resources, showing whether licences are likely to be available and highlighting areas where action is needed to reduce current abstraction (Figure 2 and Table 1).

Figure 3 illustrates how abstraction is to be managed across a hypothetical catchment subdivided into 8 river reaches and 7 groundwater management units.

In water resource management units where resources are available, the consultation document proposes a strategy for dealing with applications for new licences and variations, and for managing existing abstraction licences. Where current levels of abstraction exceed the total resource, options for resource recovery are proposed, along with a strategy for managing existing licences.

After this period of consultation, the strategy is finalised, taking into account the views of respondents and the official Catchment Abstraction Management Strategy for the next 6-year period is produced and published.

The E will then determine applications for permits and set permit conditions in accordance with the published CAMS.

Figure 1 The CAMS process (one cycle shown)

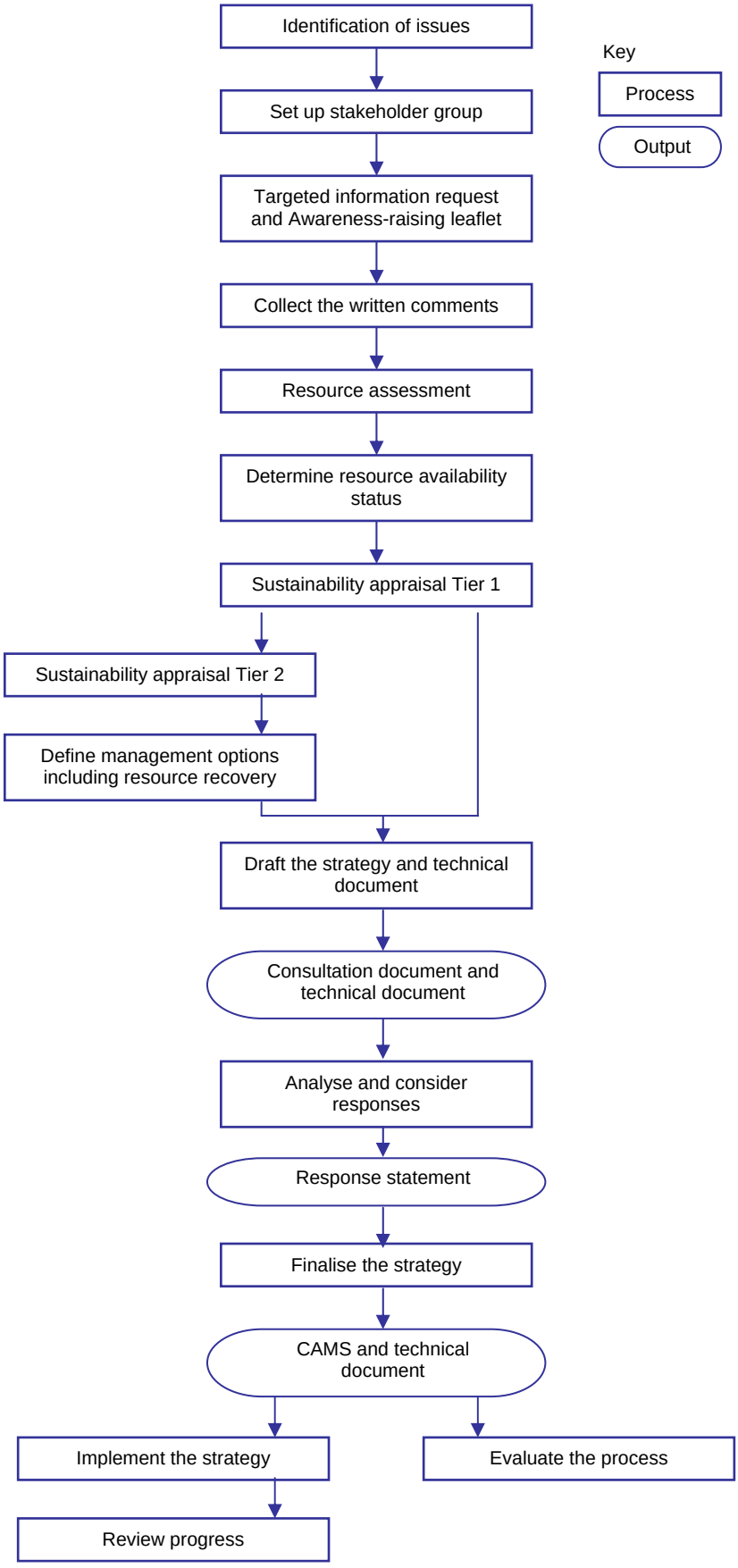
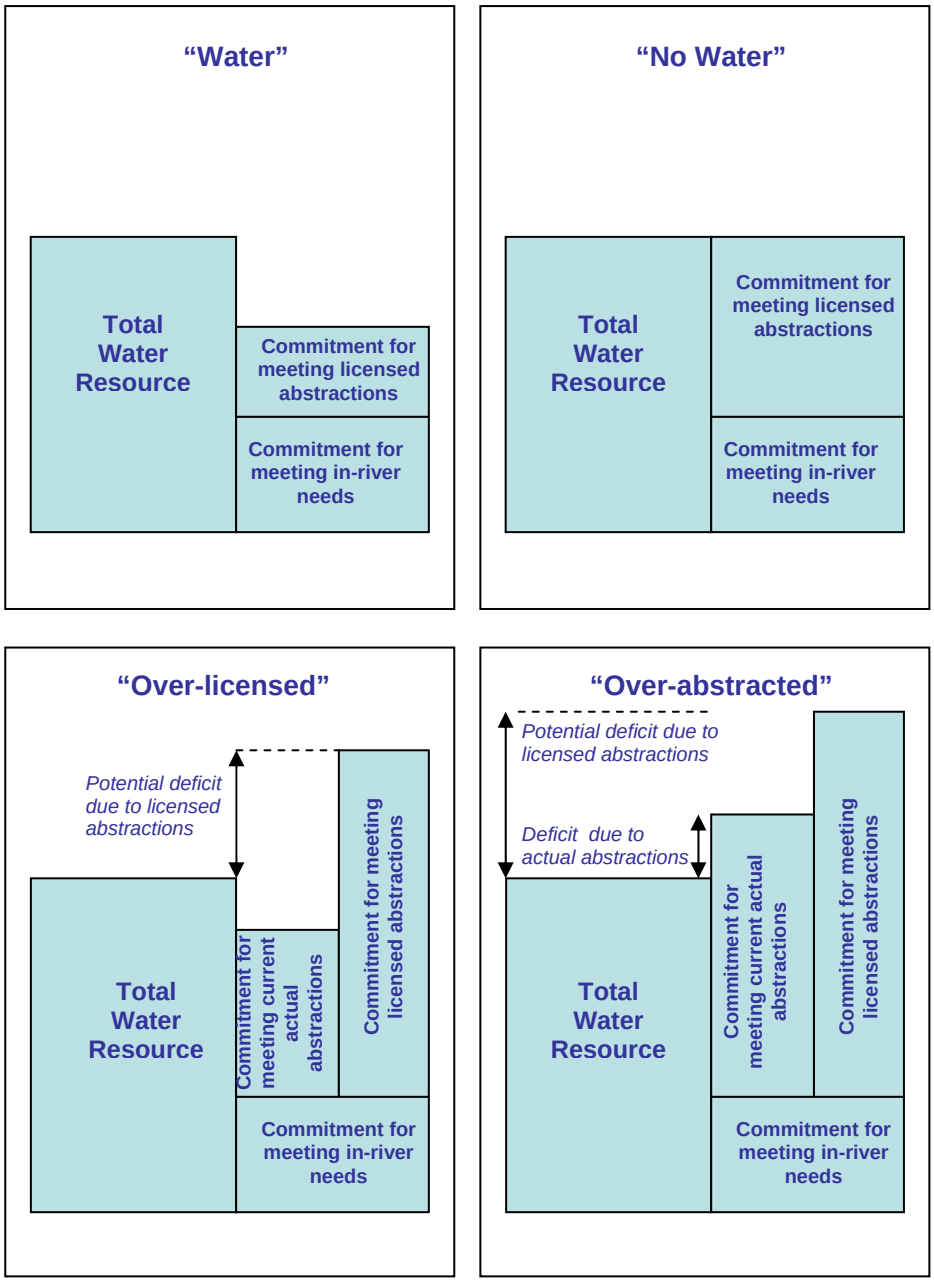


Figure 2 Illustration of the concept of resource availability status at low flows

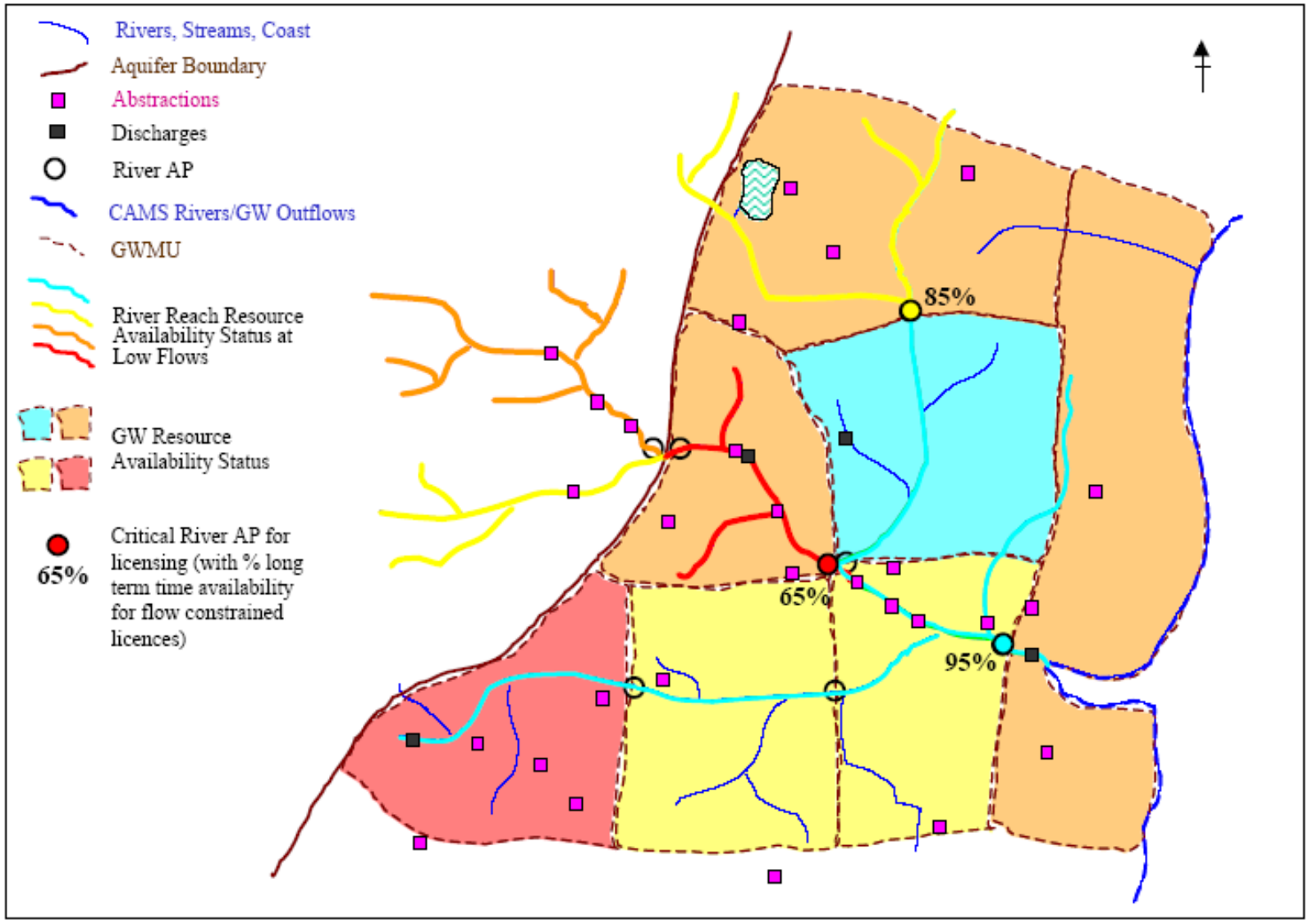


Source: 'Catchment Abstraction Management Strategies', Environment Agency, England

Table 1 Resource availability status categories used in CAMS

Indicative resource availability status	Definition
Water available	Water likely to be available at all flows including low flows. Restrictions may apply.
No water available	No water available for further licensing at low flows although water may be available at higher flows with appropriate restrictions.
Over-licensed	Current actual abstraction is resulting in no water available at low flows. If existing licences were used to their full allocation they would have the potential to cause unacceptable environmental impact at low flows. Water may be available at high flows with appropriate restrictions
Over-abstracted	Existing abstraction is causing unacceptable environmental impact at low flows. Water may still be available at high flows with appropriate restrictions.

Figure 3 Schematic map of integrated river reach and groundwater management unit resource availability status for CAMS reports



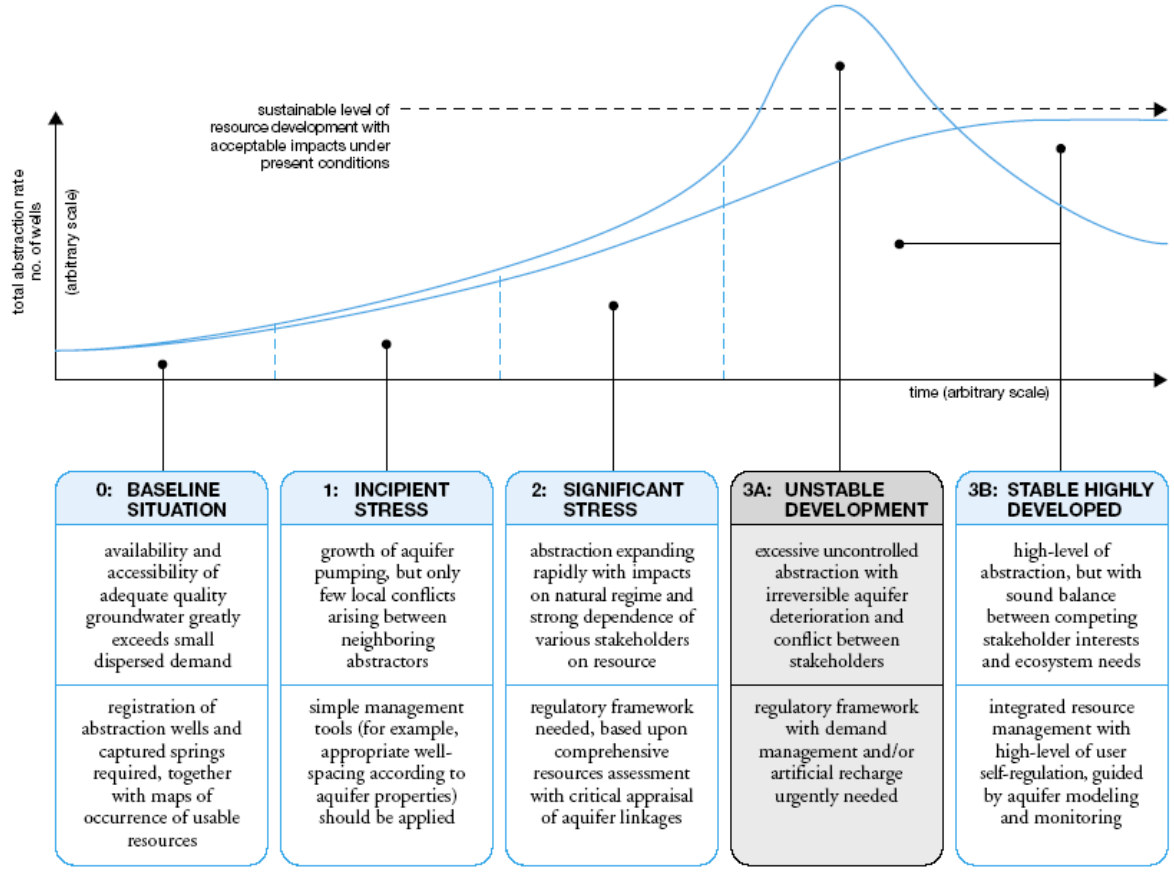
4.3 Groundwater management

Unlike surface water, groundwater is a resource that can be accessed over an area, i.e. farmers located above an aquifer can sink wells independently of each other over a wide area depending on the size of the aquifer. Being invisible groundwater is a good example of the so called 'tragedy of the commons'. Without a clear definition of who the users are and how much water they are entitled to, the users themselves have no incentive to use the water efficiently, because they have no guarantee that if they save water today, the aquifer's yield will allow them to abstract what they need tomorrow.

Water use rights are a tool to provide a long-term horizon to water users – in the case of groundwater they make the resource 'visible'.

Groundwater management implies dealing with decentralized stakeholders; the challenge to manage the aquifer in a sustainable manner is harder to achieve the more users there are that need to be involved and monitored. The challenge is greatest when over development of the aquifer has already occurred and there is a need to enforce cut backs. Figure 4 shows the degree of regulation needed to support effective management at different levels of aquifer development.

Figure 4 Stages of groundwater resource development in a major aquifer and their corresponding management needs.



Source: Groundwater Resource Management an introduction to its scope and practice GWMATE Briefing Note 1

For groundwater use rights to function as management instruments, the following need to be in place:

- initial allocation;
- registration mechanism and maintained registry system;
- functioning monitoring system;
- enforcement of the limits set by the individual or communal use rights;
- a credible sanctioning system.

In the State of Victoria, Australia, a permissible consumptive volume (PCV) or 'cap' is set by the Minister for Water and is the maximum volume of water that can be allocated in a groundwater management area. Once the groundwater management area is allocated to its PCV limit new licences cannot be issued, the only way to acquire new water in these areas is to purchase a licence from an existing groundwater entitlement holder.

Clearly a key issue in groundwater management through a permitting system is the size of the groundwater user community relative to the institutional capacity of the management agency. In the state of Guanajuato, Mexico, where the management agency was unable to control over-abstraction, an approach has been taken that strongly relies on local groundwater user groups, called COTAS, in order to complement and enforce the groundwater permit administrative system. The fundamental goal of the COTAS (as conceived) is to provide the social foundation to promote measures to slow down, and eventually eliminate, aquifer depletion.

Where an aquifer has become over-abstracted the only way to restore a sustainable level of abstraction is by progressively decreasing the consumptive use on a yearly basis. This gradual decrease can only take place if the institutional framework is sufficiently developed to allow follow-up actions (e.g. re-registering of wells and permits, and use of licensed drillers).

The Mexican experience with the COTAS was that over a 10 year period they have been able to promote awareness-raising activities and also, to some extent, water-saving investments, but there are very few COTAS that have as yet decided to restrict total water use of the aquifer or take active steps towards its stabilization. By contrast, in Arizona, USA, with a strong management system, every time a permit expires it is reconsidered from a technical point of view and the new permit will be issued taking into account the potential water savings that the user could make by installing more efficient irrigation technology. This way, total abstraction from the state's aquifers is brought down over time.

4.4 Protection of the environment

It is increasingly recognised that unsustainable land and water use practices have contributed to the degradation of the water resource base and are undermining the primary investments in irrigation, water supply and energy infrastructure, and often contributing to loss of biodiversity. Also, improvements to the 'health' of rivers and aquifers can only be achieved by addressing environmental flows, declining water quality and degraded riverine habitats in an integrated way.

A distinction may be made between the amount of water needed to

maintain an ecosystem in close-to-pristine condition, and that which might eventually be allocated to it following a process of environmental, social and economic assessment. The latter is referred to as the 'environmental flow' or 'environmental allocation', and it will be a flow or allocation that maintains the ecosystem in a less than pristine condition.

Permitting systems provide important tools to help water resources managers control abstractions to sustainable levels that balance the needs of human development with that of the environment. This sustainable level is defined at any point in time on the basis of the available scientific knowledge and social acceptability – in Europe today public and legislative pressures are moving towards a larger allocation for the environment (eg Water Framework Directive).

In managing the environmental impact of water extraction it is vitally important to have some understanding of the way in which biological risks change in relation to the changing impacts arising from water extraction, however these relationships are inherently very complex and usually poorly understood. Given the imperative to protect and maintain ecosystems in the face of strong and increasing pressures to extract water, managers often have to make decisions on controls (such as caps or permit conditions) on the basis of limited information. In such a situation water managers need to constantly monitor the effectiveness of the permitting system and be prepared to adjust their permitting rules better to meet their environmental objectives – this is referred to as 'adaptive management', and is a feature of advanced permitting systems.

All water taken for consumptive purposes in the State of Victoria, Australia, is taken under entitlements set out in the Water Act 1989. The Victorian water allocation framework outlines the Minister for Water's responsibility for allocating water through the granting of bulk entitlements.

The environment's share of water is called the Environmental Water Reserve (EWR). The EWR can be held in storage and released to a river, it can be run-of-river flow, and it can be groundwater. The EWR comprises water set aside through:

- Environmental entitlements held by the Minister for Environment
- Bulk entitlements held by the Minister for Environment
- Conditions on bulk entitlements
- Provisions in Water Supply Protection Area management plans
- Permissible consumptive volumes ("caps")
- Inter-state water sharing agreements eg Murray Darling Basin Act

Environmental entitlements have only recently been introduced under the Water (Resource Management) Act 2005. An environmental entitlement permits the use of water in a river or storage for a purpose that benefits the environment.

From an operational perspective the EWR includes two types of water:

- Water that is held in storage and actively managed to meet specific environmental needs (environmental entitlements); and

- Water that is available as a result of rules on consumptive use (conditions on bulk entitlements and water licences, management plans, and caps on water use)

The environmental entitlements enable active management of water to meet specific environmental needs such as fish spawning triggers or maintaining critical habitat during drought.

For rivers and aquifers that were not over-allocated, the EWR was initially established using a precautionary approach establishing how much the environment needed and setting a sustainable limit on diversions from that water system. For rivers and aquifers that were fully or over-allocated, the first EWR was established by initially setting caps that recognised the rights of existing water entitlement holders (thus maintaining the status quo). It was recognised that this meant that the first EWR for over-allocated resources was still inadequate to maintain a healthy river or aquifer, but an adaptive management approach was foreseen with progressive increase in EWR at a rate deemed 'acceptable' to allow users time to adapt to reduced water availability.

Box 4 illustrates that water managers in Victoria still face difficulties in ensuring adequate protection for key environmental assets (native fish in this case) through the permitting system. Two factors are at work:

- New scientific understanding needs to be reflected in a change to the EWR and permit conditions
- Attitude change is required to increase acceptance of the urgent need to cut abstractions to protect the environment – in terms of how quickly the cap on abstractions should be lowered to give more back to the environment

Both point to the need for adaptive management, the latter also points to the need to avoid procrastination since sustainable abstraction is in the long term interests of water users.

Box 4 The Goulburn River, Victoria, Australia

'Dams and diversions for irrigation have modified stream flows and water temperature in the Goulburn River, and contributed to environmental degradation that includes declining native fish populations. With the passage of a new Water Act in 1989, the Victorian Government proposed to address environmental and water allocation issues through the development of tradeable water entitlements. Initially, these had a strong environmental focus and were to be allocated within an adaptive management framework that involved monitoring and evaluation to refine the total allowable diversion to sustainable levels.

The actual specification of tradeable water entitlements for the Goulburn River, undertaken in 1995, differed substantially from those early proposals. Entitlements were largely based on historical use with limited and ineffective allocation of water to the environment because water temperature was not considered.

…… uncertainties in environmental requirements reinforce the status quo in water allocation which is dominated by production values.'

Ladson A & Finlayson B, 2002, 'Rhetoric and reality in the allocation of water to the environment: A case study of the Goulburn River, Victoria, Australia', Journal of River Research and Application, vol. 18, no. 6.

4.5 Application determination

In England when an application is submitted it will be subjected to a determination process which incorporates the following 'cornerstone' components:

1. CAMS resource availability – is resource available at this scale?

2. Has the need for the water been justified and is the proposal achievable and reasonable?

3. Local impacts: derogation of existing rights (e.g. other abstractors), water dependent sites – are these local impacts acceptable?

4. Mitigation options: can any unacceptable impacts be reduced to acceptable levels e.g. by imposing licence conditions for 'Hands Off Flows' or 'Hands off Levels', the location of returned water, or associated environmental enhancements?

The first two points are clearly a review against the prevailing abstraction management strategy, but the CAMS actually dictates the response to all four points since the CAMS sets out environmental objectives for the management unit to which the application applies.

One of the key functions of the abstraction management strategy is to set out under what circumstances no new permits will be granted, and how re-applications will be treated.

In both England and in Victoria strategic decisions have been made to reduce summer irrigation abstractions from unregulated rivers to improve environmental conditions in the low flow season. This is to be achieved by a combination of banning new permits for this use, and encouraging farmers to swap summer permits for winter permits. This latter strategy requires farmers to invest in off stream reservoirs on their farm to hold their winter abstraction until needed in summer.

New permits would only be granted in over-allocated water management units if another user gives up a permit, or in exceptional cases for a high priority use.

4.6 Using permit conditions

Referring back to Section 2.7, both general and specific conditions are normally attached to permits. This component of the permitting system is a key link to IWRM implementation.

Volume control and priority

The permit should state the total volume that may be taken over a specified period. This is usually the volume per annum but might be set as a total over a longer period, say five years. A longer period would allow more flexibility to adjust abstraction from year to year in line with variation in climate, but requires more rigorous monitoring and water accounting.

It may also specify the maximum rate and a maximum continuous period over which the maximum rate can be applied. This period might range from a few hours to longer periods.

In situations where climatic variation is significant and wet and dry conditions may persist for several consecutive years the conditions attached to some permits may include variable water allocation related to the percentage of water available in storage either at the start of the water year or varying

throughout the year. The permit in such a case should identify the priority category which determines the priority of the permit in terms of water sharing arrangements (and hence its reliability). Variable water allocation is standard practice in Victoria, but is not required in UK where the climate is less variable from year to year.

Permit systems usually have an emergency power to restrict abstraction which will be referred to in the permit conditions.

Self-monitoring of use

In most jurisdictions water users are required to provide information on actual water use to the permitting authority.

This information is of vital importance to water managers carrying out resource assessments and determining permit applications. In many situations the permitting authority does not have the manpower to undertake a comprehensive monitoring programme therefore putting the onus on the user to monitor is the only way of obtaining this valuable data.

Clearly self-monitoring, especially if fees are levied on actual use, will be open to abuse. However, the paramount need to obtain actual water use data means that the permitting authority must adopt this approach, and must couple it with rigorous enforcement. Random audits are a typical means of enforcement.

The site specific conditions attached to a particular permit allow the permitting authority to specify in detail both what method of measurement is to be employed and the type and frequency of data reporting.

Specific conditions

The specific conditions allow the permitting agency to fine tune water management by individual users and thereby exercise close control on all users in a water management unit to ensure that the objectives of the abstraction management strategy are met.

The key special conditions relate to protection for environment and other existing users (Section 4.5, point 4 above).

Implementing environmental flows requires either an active management of infrastructure such as dams, or a restrictive management, for example through reducing the abstractions for irrigation. The two require different permit conditions.

Restrictive flow management involves allocation policies that ensure that enough water is left in the river, particularly during dry periods, by controlling abstractions and diversions. In England, as in Section 4.5 point 4 above, this is referred to setting conditions for ‘Hands Off Flows’ or ‘Hands off Levels’.

Permits issued on rivers covered by a Stream Flow Management plan in Victoria have conditions setting out when water for irrigation use may be taken in accordance with a rota set out in the Plan.

When **active flow management** is applied in a regulated system, an entire flow regime can be generated, including low flows and floods. This clearly requires a complex set of conditions that will require the reservoir operator to make releases to achieve the desired flow regime.

5 Conclusions

5.1 General

At the outset it is important to note that there is no single 'best practice' model as regards the permitting of abstractions. Each country has a unique relationship with its water resources, a relationship that is shaped by a range of factors including geography, hydrology, climate, history, population size, economic development and so forth. It follows that each country's legislation in general, and approach to permitting in particular, represents a specific response to a specific set of circumstances.

Abstraction permits authorise the undertaking of activities which would otherwise be unlawful. As such they are important legal instruments that create legal consequences both for their holders as well as the state and third parties. Abstraction permits must therefore be clearly expressed if they are to be legally effective and the means for their implementation and enforcement, including the imposition of sanctions in the event of non-compliance, must be in place. To this end the permit must include sufficient and specific detailed conditions.

Moreover, the abstraction permit translates 'general' rules and duties, as contained in river basin and other plans and nationally binding rules and standards and which apply to all water users into the 'specific', namely the specific rights and obligations of individual water users: abstractors, dischargers or both.

Ultimately it is through the cumulative impact of individual abstraction and discharge permits that the quantity and quality of water in rivers is managed. Both types of permitting regime are dependent on the existence of a number of common pre-requisites including appropriate, adequately resourced, government agencies for their implementation (described generically in this report as the 'permitting agency'), adequate data and modelling and increasingly on planning activities at the basin or catchment level.

5.2 Trends

There are a number of trends in permitting systems discernable:

- Primary legislation has increasingly been put forward promoting IWRM and permitting systems have changed accordingly
- An emphasis on adaptive management, ie allowing water managers to adjust permitting strategies to ensure identified environmental objectives are met. The EU Water Framework Directive sets out a 6-year cycle for review of objectives and measures.
- In recognition that water quality is a determining factor in water use there is increasing linkage between abstraction and discharge permitting systems
- Even within abstraction permitting systems water quality now plays a larger part in the assessment process
- Increasing use of time limited permits to give water managers greater flexibility to deal with changing resource and demand patterns
- Emphasis on environmental needs, including active measures to return to more sustainable

water use and restore water quality

- Recent developments have emphasised stakeholder participation in planning and the permit process
- Growing public understanding of environmental impacts of development. Bottom up demands for environmental improvement influence permitting authorities.
- Name and shame – media and public opinion pressure to comply with permit conditions, and pressure to demonstrate efforts to reduce damage. As the level of public awareness of environmental issues rises so reputational damage becomes more influential than fines in enforcement.
- Introduction of water entitlement and water allocation trading driven by difficulties in managing abstractions in heavily developed water bodies

中华人民共和国

取水许可证

取水（永）字[2006]第[illegible]号

根据《中华人民共和国水法》、《取水许可制度实施办法》等法规，经审查，批准 [illegible] 按规定在 [illegible] ，取地下 水，年取水量 20.14 万立方米，特发此证。

取水有效期限：自 2006 年 3 月 20 日

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Water abstraction permit

Document Reference Sheet

Glossary:

Adaptive management	Sometimes referred to as ‘learning by doing’
Beneficial use	Categories of use considered to give benefit, eg irrigation, mining and industrial application, livestock watering, domestic and municipal use, and other non-wasteful economic activities, and environmental support. Categories defined by the licensing authority.
CAMS	Catchment Abstraction Management Strategy, England
COTAS	Groundwater user groups in Guanajuato State, Mexico
Derogation	Legal term for adverse impact on an existing legal right
EU	European Union
EWR	Environmental water reserve, Victoria, Australia
Licence	A legal document giving official permission to carry out some activity eg licence to drive. In some jurisdictions equivalent to ‘Permit’.
NWRB	National Water Resources Board, Philippines
PCV	Permissible consumptive volume, Victoria, Australia
Permit	A legal document giving official permission to do something, granting a right. In some jurisdictions equivalent to ‘Licence’
Prior appropriation	Legal doctrine applied in the water short western states in the USA. In essence while no one may own the water in a stream, all persons, corporations, and municipalities have the right to use the water for beneficial purposes. The allocation of water rests upon the fundamental maxim "first in time, first in right”. The first person to use water (called a "senior appropriator") acquires the right (called a "priority") to its future use.
Riparian	Of or relating to or located on the banks of a river or stream; ‘riparian land’; ‘riparian rights’ of owners of lands bordering watercourses which relate to the water and its use
Riverine	Habitat within or alongside a river or channel, riverine areas are those through which rivers continuously or periodically flow
Usufruct	Legal right to use and derive profit from property belonging to someone else provided that the property itself is not injured in any way

Document Reference Sheet

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Related materials from the MWR IWRM Document Series:

Advisory Note 2.4/1	Environmental Risk Assessment
Advisory Note 2.4/2	Environmental Water Allocation
Thematic Paper 2.7	Water Allocation Issues
Example 4.1	Water Abstraction Permit Management: Current Practise and Alternatives for Shiyang River Basin
Thematic Paper 5.3	Water Resource Fees

Where to find more information on IWRM – recommended websites:

Ministry of Water Resources: www.mwr.gov.cn

Global Water Partnership: www.gwpforum.org

WRDMAP Project Website: www.wrdmap.com

China – UK, WRDMAP

Integrated Water Resource Management Documents
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Advisory Services by : Mott MacDonald (UK) leading a consultancy team comprising DHI (Water and Environment), HTSPE (UK), IWHR, IECCO (Comprehensive Bureau), CIAD (China Agricultural University), Tsinghua University, CAAS-IEDA, CAS-CWRR, Gansu WRHB and Liaoning WRHB.

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