

**Balancing Development and Environmental Conservation and Protection of the Water
Resource Base – The “greening” of water laws**

Stefano Burchi*

Senior Legal Officer, Development Law Service, Legal Office
Food and Agriculture Organization of the United Nations (FAO)
viale delle Terme di Caracalla, Rome 00100 ITALY

Stefano.Burchi@fao.org

+39 06 570 53959

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Abstract

Balancing the goals of development with those of environmental protection and conservation is at the heart of many contemporary water resources laws. Environmental and conservation requirements of freshwater bodies, both surface and underground, increasingly tend to be treated in water resources legislation on a par with the development exigencies of society. The “greening” of water laws is borne out by the consistent recourse of the latest generation of water laws to distinct regulatory and other mechanisms. Minimum environmental flows of rivers, environmental water trades and water trusts, environmental impact assessment requirements, the national “reserve” and protected areas and zones, ecosystem service payment schemes and the specific safeguard of aquifers in recognition of their ecosystem support function, all point in the direction of the ever-increasing currency environmental protection and conservation goals have been gaining with policymakers and lawmakers in regard to the dwindling water resource base. The paper will explore and illustrate these mechanisms as they feature in the comparative legislation of selected countries.

Key words and phrases

Ecosystem payment service, Environment impact assessment, Legal regulation, Minimum flow requirement, Protected areas, Water-ecosystems link, Water reserve, Water rights, Water trading, Water trust.

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1. INTRODUCTION

Many references to the term ‘sustainable development’ pervade discourses on the management of natural resources, particularly the diminishing supply of freshwater reserves worldwide. This entails reconciling the seemingly different goals of socio-economic development, and environmental protection and conservation as essentially two sides of the same coin. Ultimately, efficient development strategies are those that sufficiently consider the finite nature of the water resource base and its dependent ecosystems. Addressing this concern, reforms in the water sector have increasingly mainstreamed environmental considerations into the elaboration of new laws or the review of existing legislation. This paper elucidates how environmental concerns are contained, reflected or given prominence within national water laws through a number of regulatory and other mechanisms – essentially it examines the “greening” of modern water laws.

The mechanisms examined in detail in this paper include: minimum environmental flows of rivers, environmental impact assessment (EIA) requirements, the national ‘Reserve’ and protected areas and zones, environmental water trades and water trusts, ecosystem service payment schemes and the specific safeguard of aquifers in recognition of their ecosystem support function. This list is not exhaustive of the ways in which environmental protection is accommodated in the water law framework; indeed, many provisions contained in legislation which regulate water use incorporate to some degree protection and conservation of surface or underground water bodies. The first section of the paper takes note of the varied types of environmental and conservationist approaches integrated into the legislation that are of a more general nature, before addressing in detail the selected regulatory mechanisms highlighted above.

2. GENERAL ENVIRONMENTALLY-CONSCIOUS PROVISIONS IN WATER LAWS

Permits and licences are the primary instrument of water use regulation, with environmental considerations frequently injected into licensing criteria. Examples would include: technical ecological evaluation or environmental impact analyses before the issuance of a permit; authorisations based on considerations such as the annual average availability of water, and existing water rights and uses;² and, in relation to waste disposal, setting levels for chemical and physical components, its volume and specifying requisite treatment measures.³ In Namibia, consideration of the environmental effects is one of the specified criteria for successful applications for water abstraction and effluent discharge (taken into account when processing applications), and also forms part of the terms and conditions of such concessions.⁴

Anti-pollution provisions are prevalent in almost all water legislations as a crucial instrument of the protection of water quality, but the objective of this paper is to elucidate how specific environmental purposes are factored into the law beyond protection of the water body itself. Statutes give effect to a range of strategies with a conservationist design based on local and national priorities. National water programs and planning, with which all government decisions must generally comply, increasingly take into account environmental protection exigencies, having gone through processes of public consultation and liaison between water

² Mexico, Law on National Waters (1992) as amended by Decree of the President of the Republic on 29 April 2004, article 22 [hereafter Mexico, Law on National Waters].

³ South Africa, National Water Act No. 36 of 1998, section 29 [hereafter South Africa, National Water Act].

⁴ Namibia, Water Resources Management Act No. 24 of 2004, sections 33, 34, 35 and 37 [hereafter Namibia, Water Resources Act].

management committees and other government bodies (including environmental agencies). Water use provisions of the master plan must ascertain the uses or activities which adversely affect water sources or their dependent ecosystems, and also land-based activities with negative ramifications for adjacent water bodies such as soil erosion, increase in salinity, or clearing of vegetation.⁵ Environmental protection priorities are often underscored in the fundamental or guiding tenets at the start of many water management laws, mandating that these principles are to be borne in mind in the reading, construction and implementation of the law. A case in point are the water management principles of the New South Wales Water Management Act⁶ which mandate that

“water sources floodplains and dependent ecosystems (including groundwater and wetlands) should be protected and restored [...]; habitats, animals and plants that benefit from water, or are potentially affected by managed activities should be protected and (in the case of habitats) restored; [...] the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems, should be considered and minimised.”

Also the South African National Water Act, 1998 elucidates the necessary balance that must be struck between development and environment protection goals:

“3(1) As the public trustee of the nation's water resources the National Government, acting through the Minister, must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons and in accordance with its constitutional mandate.

(2) Without limiting subsection (1), the Minister is ultimately responsible to ensure that water is allocated equitably and used beneficially in the public interest, while promoting environmental values.”

The trend towards integrated water resources management has meant that water protection provisions can be found in legislation governing other natural resources such as forest or land laws in addition to, or independent of water resources legislation. The Andhra Pradesh (India) Water Land and Trees Act⁷ stipulates that local authorities may formulate guidelines for landscaping and tree planting along canal banks and water bodies, and must ensure tree plantation in the “fore-shore area of open water bodies.”⁸ Tree felling or branch cutting in these areas is subject to permit conditions.⁹ Land development and construction plans may be subject to vetting by water resource authorities who regulate and monitor activities which may potentially damage nearby water bodies. In Florida, land development activities such as the construction of buildings and roads which exceed a prescribed size fall within the remit of the ‘environmental resource permitting’ program.¹⁰ This program which entails state-wide monitoring and control of activities which alter the surface flow of waters, receives statutory backing in the Florida Administrative Code.¹¹ An applicant for an approval permit must provide reasonable assurance that the activity will not cause adverse water quantity or quality impacts, nor “adversely impact the value of functions provided to fish and wildlife and listed species by wetlands and other surface waters.”¹²

3. SELECTED MECHANISMS

⁵ Australia New South Wales Catchment Management Authorities Act 2003, article 23(b) and (c) [hereafter the New South Wales Act 2003].

⁶ Australia New South Wales Water Management Act No. 92 of December 2000 [hereafter the New South Wales Act 2000].

⁷ India, Andhra Pradesh Water Land and Trees Act No. 10 of 2002 [hereafter Andhra Pradesh Act].

⁸ Andhra Pradesh Act, section 30, note 7.

⁹ Andhra Pradesh Act, section 28, note 7.

¹⁰ See Joelle Hervic, ‘Water, Water Everywhere?’, Florida Bar Journal Volume LXXVII No. 1 Jan 2003.

¹¹ Rule Number 40C-4.301, Florida Administrative Code.

¹² Rule Number 40C-4.301 §1(e), Florida Administrative Code.

3.1 Minimum environmental flows of rivers

Minimum flow refers to the least amount of water required within a watercourse which is necessary to maintain water quality and the survival of dependent ecosystem varieties. In light of the fundamental importance of this function of preserving the watercourse's physical availability, biodiversity as well as ultimately ensuring its economic and developmental value, numerous legislative strategies have been applied which will be discussed in this paper: a statutory requirement of a protected minimum 'environmental' flow, wild and scenic rivers legislation, and the creation of a 'Reserve' (below section 3.3).¹³

The statutory requirement mechanism is most frequently used, where an explicit reference is made to the need to maintain the minimum flow requirement of watercourses for example, to maintain fish populations and the health of riverine ecosystems.¹⁴ Progressively, water laws have emphasised the importance of maintaining this minimum quantity largely through monitoring and regulating the number and volume of abstractions. In this regard, environmental minimum flow requirements of rivers may be given priority on available river flows.¹⁵ In certain countries, laws may stipulate the actual percentage of minimum flow requirements, for example the Chilean framework notes that this figure should not be greater than twenty percent of the average annual flow, or in exceptional cases as set by the President, not more than forty percent of the average annual flow.¹⁶ Under this law, minimum requirements will only affect permits granted *after* the establishment of standard percentages. Considering stream flows vary naturally along the watercourse and at different times of the year, certain laws may legislate on the minimum flow for each individual stream type. The Swiss Federal Law on the Protection of Waters (1998) prescribes water protection targets and minimum flow figures for different average flow rates which take into account the ecological function of the water bodies.¹⁷ While regulations at the federal level establish minimum flows, the cantons may flesh out these provisions depending on geographic, economic and ecological factors.¹⁸ The 'environmental water' classification of the New South Wales Water Management Act 2000 effectively allocates water resources for meeting environmental requirements such as "fundamental ecosystem health or other specified environmental purposes", based on a ranking of the state's water resources according to the level of environmental stress or risk and conservation value.¹⁹

The United States Wild and Scenic Rivers Act protects the minimum environmental flow and water quality of certain selected watercourses valued for their scenic, biological or cultural significance by preserving their "free-flowing condition."²⁰ Dams and other structures can thus only be put up at appropriate sections of the rivers. The Act institutes this "national wild and scenic rivers system, by designating the initial components [...] and by prescribing the methods by which and standards according to which additional components may be added to the system from time to time."²¹

¹³ Megan Dyson, Ger Bergkamp and John Scanlon (eds), 'Flow: The Essentials of Environmental Flows', IUCN, Gland, Switzerland and Cambridge, UK (2003) xiv + 118 pp [hereafter Dyson, Bergkamp and Scanlon].

¹⁴ Kyrgyzstan, Water Code Law No.8 of 2005, article 64.

¹⁵ Spain Law No.10 of 5 July 2001, concerning the National Water Master Plan, article 26(1), [hereafter Spain, National Water Master Plan].

¹⁶ Chile Law No. 20.017 of 11 May 2005 (amending the Water Code), article 129bis 1.

¹⁷ Dyson, Bergkamp and Scanlon, note 13.

¹⁸ Stefan MM Kuks, 'The Evolution of National Water Regimes in Europe: Transitions in Water Rights and Water Policies' Paper for the Conference on "Sustainable Water Management: Comparing Perspectives from Australia, Europe and the United States" 15-16 September 2005 at The National Museum of Australia, Canberra, Australia. Hosted by the National Europe Centre at The Australian National University.

¹⁹ New South Wales Act 2000, section 8, note 6.

²⁰ US Wild and Scenic Rivers Act, Title 16, Ch 28, § 1271.

²¹ US Wild and Scenic Rivers Act, Title 16, Ch 28, § 1272.

Certain activities (including land-based activities) may affect the stream flow of watercourses. The South African National Water Act delineates what constitutes stream flow reduction activities, which it defines as any activity which reduces the “availability of water in a watercourse to the Reserve, to meet international obligations, or to other water users significantly”,²² and regulates such activities through the Minister. Examples of such activities are listed as afforestation for commercial purposes and cultivating vegetation, and in declaring such an activity the Minister must take into account factors such as the *extent* of streamflow reduction, and its *effect* on the water class and the national Reserve (discussed below section 3.3). While not included as part of specific minimum flow requirement articles *per se*, water law provisions directed at the construction and operation of dams caution against any adverse effects on water quantity, minimum flow or the environment.²³ The Namibian framework ensures the preservation of ‘resource quality’ is not affected by operation or failures of hydropower projects; ‘resource quality’ encompassing in this case *inter alia*, the “quantity, pattern, timing, water level and assurance of stream flow; [and] ... the character and condition of the stream and riparian habitat.”²⁴

3.2 Environmental Impact Assessments (EIAs)

EIAs are most commonly found as part of the statutory set-up with respect to granting concessions for water use (most frequently surface and groundwater abstractions and waste disposal), but also in planning instruments at catchment or national level. These assessments are undertaken to evaluate the introduction of a factor or activity within a given area which would affect the ecological balance. The double-pronged goals of development and environmental protection are visible side by side in the EIA provisions of the EU Water Framework Directive. This instrument orders, for each river basin district, an analysis of the basin’s characteristics, a review of the impact of human activity on the status of surface water and on groundwater, and an economic analysis of water use according to the technical specifications set out in Annexes II and III.²⁵

Several national water laws follow the trend of including EIAs as pre-requisites for licenses. In Cameroon, water abstraction authorisations declare that the applications must be accompanied by an impact study of such proposed use, together with conclusions from the agency responsible for the environment.²⁶ Permits for the discharge of wastewater, as well as development and abstraction concessions must be applied for together with an environmental impact statement, also prepared under the relevant environment protection legislation under the Mexican framework.²⁷ Similarly, the Kenyan statutory framework outlining the procedure for obtaining permits stipulates that environmental impact assessment shall be carried out in line with relevant provisions detailed in the Environmental Management and Co-ordination Act 1999.²⁸ Such studies are also used in a number of other water-related areas, for example under the Chinese Water Law of 2002, review and approval of an impact assessment report must be completed before the construction of sewerage outfall projects.²⁹ In South Africa, consultation and environmental impact assessment must be prepared before the

²² South Africa, National Water Act, article 36, note 3.

²³ For example, in Mali hydropower dam projects must meet minimum flow requirements in the watercourse, in support of fish life (Mali Water Code, Law No.02-006 of 31 January 2002, article 62).

²⁴ Namibia, Water Resources Act, section 1, note 4.

²⁵ EU Directive 2000/60/EC of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy, article 5 [hereafter EU Water Framework Directive].

²⁶ Cameroon Décret No. 2001/164/PM, article 5(4)(a).

²⁷ Mexico, Law on National Waters, article 21bis (III), note 2.

²⁸ Kenya Water Act (Cap 732) No.8 of 2002, article 29(3) [hereafter Kenya, Water Act].

²⁹ China Water Law of 2002, article 34.

construction of waterworks, the report summary of which must be published in the Gazette. Also two years following the completion of such waterworks, the Minister must again consider the results of another environmental impact assessment.³⁰

3.3 National Reserves and Protected Areas for Environmental Purposes

The South African National Water Act which created the ‘ecological’ and ‘human needs’ reserves, effectively served as a prototype for numerous subsequent legislations which established such a category. A ‘national reserve’ refers to the “the quality and quantity of water that is required to satisfy present and future basic human needs, as well as to protect aquatic ecosystems and to secure sustainable development and use of that water resource.”³¹ Other statutes recognize the use of reserves for domestic and urban needs, but almost always incorporate the environmental protection dimension. The Spanish Law on the National Water Master Plan³² empowers the government to set aside entire rivers (or sections thereof), aquifers or other water bodies as part of the environmental reserve; it also indicates that one of the possible legal consequences of such a reservation is that new water abstraction rights and licenses in that area may be prohibited.³³ In Kenya, a determination of the reserve entails a component for protection of aquatic ecosystems “in order to secure ecologically sustainable development and use of the water resource”;³⁴ a sufficient stipend is made available for each constituent of the reserve.³⁵ Laws frequently direct that the requirements of the ‘Reserve’ are taken into consideration in all water-resource related decisions by the government and also in the formulation of national and catchment-level strategies.

Protected areas and zones are analogous conceptually to the notion of the Reserve, and those relevant to this study aim for the protection of

“any water resource, riverine habitat, watershed, wetland, environment or ecosystem at risk of depletion, contamination, extinction or disturbance from any source, including aquatic and terrestrial weeds.”³⁶

The purposes of such a designation - and banned activities therein - are often included in the main statute, with the specific geographic boundaries in which they apply indicated in subsidiary legislation. The types of proscribed activities in the water body or its vicinity include the application or storage of pesticides or fertiliser chemicals, road construction, tree felling, mining, abstractions and effluent discharge. The government may be directed to establish procedures concerning the allocation of land use and forest use at water ecosystem protection zones; the construction of pipelines or other communication devices, and extraction of biological resources and materials at water ecosystem protection zones.³⁷

The procedure by which Reserves and protected areas are established is often included in the law which elaborates the steps for public consultation, for example in the national Law Gazette, inviting written comments and stipulating time frames and deadlines for feedback. The Victoria Water (Irrigation Farm Dams) Act³⁸ involves significant stakeholder input thus acquiring extensive information bases which include authorities charged with environmental protection.³⁹ Article 32(a) of the statute expressly identifies the objective of binding

³⁰ South Africa, National Water Act, section 110, note 3.

³¹ Armenia Water Code 2002, article 1.

³² Spain, National Water Master Plan, note 15.

³³ Spain, National Water Master Plan, article 25, note 15.

³⁴ Kenya, Water Act, article 1, note 28.

³⁵ Kenya, Water Act, article 13(2), note 28.

³⁶ Namibia, Water Resources Act, section 72, note 4.

³⁷ Armenia Water Code 2002, article 121(5).

³⁸ Australia Victoria Water (Irrigation Farm Dams) Act No. 5 of 2002 [hereafter Victoria Act 2002].

³⁹ For example the Consultative Committees in charge of drafting a management plan for the area in article 29 of the Victoria Act 2002, note 38.

management plans for the water area produced by stakeholder ‘consultative committees’, as being to ensure the equitable and sustainable management of resources, and prescribes “conditions relating to the protection of the environment, including the riverine and riparian environment.” Enforcement provisions for protected areas can take the form of registering and publicising the specific zones, as well as setting up monitoring systems and programs to ensure compliance.⁴⁰

3.4 Water Trading and Trusts

3.4.1 Water Trading and Development

Traditionally used as a device by which to alleviate pressure on scarce freshwater sources through the efficient allocation of water resources for abstraction and use permits and concessions, the trade of water rights usually involves transfers of water for monetary compensation. Pre-requisites to such a framework necessitate legislation that recognises the limits on the availability of the resource, clearly defines water property rights and establishes the parameters of the trading structure⁴¹ - notably conditions on transfers and use aimed at preventing adverse third party effects, particularly on the environment. Mexican law for instance authorizes the transfer of permits wholly or partially, permanently or temporarily during certain seasons.⁴² Temporary permits are subject to prior notification to the government,⁴³ whereas permanent concessions require a review before the exchange if the transfer does not entail modifications to the terms of the grant or if it may have a third-party, environmental or hydrological effects.⁴⁴

The California Water Code which distinguishes between long-term and short-term water entitlement transfers mandates that “the change will not operate to the injury of any legal user” of the relevant water body.⁴⁵ Whereas provisions governing short term transfers call for the avoidance of ‘unreasonable’ effects on fish and wildlife, this proviso is missing from the provisions governing long-term transfers. To fill this lacuna, the State Water Resources Control Board relies on its responsibility under the public trust doctrine to judge whether the approval of such a long-term change is in the public interest.⁴⁶ Environmental protection and conservation is gaining priority in what is in the public interest.

Elsewhere in the U.S. West where the “prior appropriation” doctrine of water allocation dominates, the upshot of the doctrine’s requirement to use a water right or risk losing it, and of water salvage laws intending to prevent waste and encourage fuller water use, is the tendency to over-use abstraction rights which contributes to environmental degradation.⁴⁷ This particular problem has been addressed in Oregon state legislation⁴⁸ which directs the salvager to return to the state 25 per cent of the conserved water to maintain stream flow

⁴⁰ EU Water Framework Directive, article 6, note 25.

⁴¹ Megan Dyson and John Scanlon, ‘Trading in Water Entitlements in the Murray Darling Basin in Australia – Realizing the Potential for Environmental Benefits’, IUCN ELP Newsletter Issue 1 2002.
http://www.iucn.org/themes/law/pdfdocuments/Neuchatel_Trade%20MDBC%20ELP%20Article%20Final.pdf.

⁴² Mexico, Law on National Waters, note 2.

⁴³ Mexico, Law on National Waters, article 23bis, note 2.

⁴⁴ Mexico, Law on National Waters, article 33, note 2.

⁴⁵ California Water Code, § 1702.

⁴⁶ ‘A Guide to Water Transfers’ Draft (July 1999) Division of Water Rights, State Water Resources Control Board, California Environmental Protection Agency
<http://www.swrcb.ca.gov/general/publications/docs/watertransferguide.pdf>.

⁴⁷ ‘Water Transfers in the West: Efficiency, Equity, and the Environment’ (1992) Commission on Geosciences, Environment and Resources (CGER) National Academy of Sciences [hereafter Water Transfers in the West (1992)].

⁴⁸ The Conserved Water Program (Oregon Revised Statute 537.455).

levels, in exchange for granting the water user the right to reallocate (sell or lease) the remaining portion of saved water.

By encouraging the economically efficient allocation and use of water, “environmental water transactions have gained a prominent role as an important tool in protecting and restoring water-dependent ecosystems in a way that minimizes disruption and controversy.”⁴⁹ The recourse to the market technique in the pursuit of water-related environmental protection goals aptly illustrates the juxtaposition of development and conservation, where in essence the environment has become a market player, and transfers can be based on environmental considerations.

3.4.2 Water Trusts

Another corollary to water trading is the water trust mechanism, with the pioneering Oregon Trust in the US illustrative of an alternative method to restore the minimum environmental flows of water sources, by acquiring ‘out-of-stream rights’ and converting them to ‘instream flows’. The former comprise resource-intensive water rights such as for irrigation purposes, while the latter connotes non-consumptive use; such a conversion seeks to rehabilitate streamflows during non-consumptive periods, which as a result of contributing factors such as over-abstraction under the prior appropriation doctrine, was often diminished below the minimum flow requirement.⁵⁰ Oregon’s Instream Water Rights Act⁵¹ recognised instream flows protecting aquatic habitats as a beneficial use of water, providing three ways to create instream rights. One such method is the creation of trust rights which are those the state has acquired through purchase, lease – wholly or partially – or donation (which may be subject to conditions such as for example that the trust be used for environmental purposes, and thus must be administered in accordance with that condition).

The strategy adopted by the Oregon Trust was to leave the larger rivers and water bodies to the federal budget, and instead concentrate its lesser state budget on acquiring rights attached to smaller water sources, which affords a greater ecological advantage as this accounts for a higher proportion of the water in smaller rivers.⁵² The benefits of such a mechanism is especially perceptible in legal systems which accord priority of water use according to the ‘first in time, first in right’ rule; trust rights retain the date of the original right, thus maintaining its seniority in terms of use.⁵³

3.5 Environment or ecosystem service payments

The market mechanism can also be employed towards ecological and conservation purposes through payment for services that confer water-related environmental benefits. Ecosystem services refer to the natural “interactions of living organisms with their environment” which provide important benefits to society such as purifying water or detoxifying waste;⁵⁴ more commonly, they fall within the purview of environmental statutes but are now finding their way into some modern water laws as well. Payment systems thus offer financial incentives for

⁴⁹ Steven Malloch, ‘Liquid Assets: Protecting and Restoring the West’s Rivers and Wetlands through Environmental Water Transactions’, March 2005, Trout Unlimited, Inc [hereafter Malloch (2005)].

⁵⁰ Andrew Purkey and Clay Landry, ‘A New Tool for New Partnerships: Water Acquisitions and the Oregon Trust Fund,’ Water Law 12 2001 5, [hereafter Purkey and Landry (2001)].

⁵¹ Instream Water Rights Act (Oregon Revised Statute 537.348).

⁵² Purkey and Landry (2001), note 50.

⁵³ Malloch (2005), note 49.

⁵⁴ James Salzman, ‘Creating Markets for Ecosystem Services: Notes from the Field’, New York University Law Review 2005 Vol 80, at p. 870.

land owners or managers to carry out or refrain from certain activities which ultimately reverberate on the quality and dependability of freshwater systems.

The movement towards accommodating this mechanism in the legislative framework has been observed,⁵⁵ and is gaining momentum in water resources statutes as evidenced in Costa Rica, with Ecuador and Guatemala having local regulations to this effect. Early provisions were seen in the Swiss Federal Law on the Protection of Waters 1998 which sought to protect water quality by granting monetary recompense of up to 80 per cent for farmers who implemented additional measures (beyond the standards of good agricultural practice as laid down by law) that limited the run-off of agricultural pesticides and fertilisers from their land.⁵⁶

In line with the theme of this paper, Costa Rica instituted a water tariff structure which highlights the economic, social and environmental importance of water.⁵⁷ Water charges comprise a 'use' element and an 'environmental' element;⁵⁸ half of the proceeds of the collection of water charges are allocated for national water management and for specific projects, and the remainder to conserve, maintain and restore the basin unit ecosystem which include surrounding forests. As part of the National Forestry Fund that finances the Environmental Services Payment Programme, this is used to remunerate private property holders within forests for the services rendered therein which result in water resource conservation and protection. Part of these funds can also go to the municipalities to fund the purchase of private land for the protection of groundwater recharge areas, and for the protection of water sources of local significance.⁵⁹

3.6 Safeguard of aquifers in recognition of their ecosystem support function

Water laws often contain discrete and self-standing provisions on aquifer protection, perhaps in response to their particular licensing requirements such as bore-hole drilling or well construction; but also because of the importance of these resources as a source in their own right, their connection to surface water bodies, and their support function to neighbouring wetlands and forests. The New South Wales Act 2000 provides for an aquifer interference activity approval by the government, and in any event, the activity must avoid land degradation such as the decline of native vegetation, increased acidity, and soil erosion. The management plan for the relevant area where such controlled activity occurs must identify the nature of the aquifer interference having any effect, including "cumulative impacts, on water sources or their dependent ecosystems, and the extent of those impacts."⁶⁰ Plans for such controlled activity also deal with undertaking work with a view to rehabilitating the water source or its dependent ecosystems and habitats.⁶¹ The Namibia Water Resources Management Act 2004 empowers the Minister to establish the 'safe yield' of aquifers when making determinations regarding its use, where 'safe yield' refers to the amount and rate of abstraction which would not cause damage to the aquifer, quality of the water or the environment.⁶²

4. Discussion and Conclusion

⁵⁵ Id.

⁵⁶ Switzerland, Swiss Federal Law on the Protection of Waters 1998, article 62a.

⁵⁷ Costa Rica Decree of the President of the Republic No. 32868 of 24 August 2005 Inaugurating and Regulating a Water Charging Scheme [hereafter Costa Rica, Water Charging Scheme].

⁵⁸ Costa Rica, Water Charging Scheme, article 3, note 57.

⁵⁹ Costa Rica, Water Charging Scheme, articles 14 and 15, note 57.

⁶⁰ New South Wales Act 2000, section 5(8), note 6.

⁶¹ New South Wales Act 2000, section 33, note 6.

⁶² Namibia, Water Resources Act, section 51, note 4.

The foregoing analysis draws from contemporary laws from a range of jurisdictions spanning all the continents with differing water policy priorities, but nevertheless incorporating similar environmentally conscious regulations. The mechanisms identified in this paper are not exhaustive, but indicative of recent trends towards a “greening” approach to water law. These “greening” strategies are not without practical difficulties, however. For example, the emergent ecosystem payment schemes are advantageous in their low-cost and straightforward implementation, but their environmental efficiency has nevertheless been questioned. Also, the utility of considering minimum flows for permit issuance is qualified by the fact that laws cannot have retrospective effect - while it is often a primary consideration for granting new permits and licenses or renewing existing ones, those that were issued prior to the passing of the law (which introduces such provisions) are precluded from its ambit. Furthermore, some provisions which seek to protect in-stream flows have been criticised for having overly-limiting language or a narrow scope, for example protecting ‘fish’ instead of the more comprehensive formulation of ‘ecosystems’.⁶³

It should also be highlighted that the purpose of some environmentally-conscious water law provisions may be frustrated by other laws; for example, the Philippines Biofuels Act⁶⁴ stipulates that, as an incentive to the production of biofuels, water effluent from the production of biofuels is exempt from wastewater charges – the *raison-d’être* of the latter being to discourage effluent discharges as much as possible. Clearly this is a case of two environmentally-conscious statutes working at cross-purposes, possibly reflecting inconsistent policy direction – or a conscious decision to sacrifice one environmental goal for another competing environmental goal.

On a concluding note, the “greening” of water laws which emerges from a comparative review of the more recent generation of water resources statutes can be regarded as a tangible manifestation of mounting concern for the *sustainability* of resource development and utilization, with sustainability turning from an elusive distant goal to precise rights and obligations accruing to the government in its capacity as custodian and manager of the resource, and to members of the public as resource developers and users.

⁶³ Water Transfers in the West (1992), note 47.

⁶⁴ Philippines Biofuels Act No. 9360 of 2006.