21. Water resources management in federal systems

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This volume has looked at the management of water resources in nine federal countries, as well as China. The chosen federations (Australia, Brazil, Canada, India, Mexico, Pakistan, South Africa, Spain and the United States) represent a good cross section of the world's estimated 28 federations and include most of those that have large territories or complex river systems.[1] They are also highly diverse political systems facing very different water management demands.

Water system governance is challenging whether in unitary, federal or international contexts, so it is useful to bear in mind comparisons with unitary and international alternatives when considering what is special about federal arrangements. Federalism is a spatial form of governmental organization and water systems themselves are spatially defined, but political and hydrological boundaries often do not coincide. Moreover, in federal regimes, both the central and the state governments can share powers affecting water system management, sometimes along with water management agencies that have a good deal of autonomy and direct participation of stakeholders. Thus federalism poses special issues for water governance, which this volume has explored. While the constitutional arrangements around water management vary considerably, successful integrated water management seems to require both orders of government to work cooperatively, often with some clear leadership at the federal level. However, many federations fall short of success because competition trumps cooperation and the federal government may be unable or unwilling to show leadership.

21.1 NATURE AND VARIETY OF FEDERAL SYSTEMS

Federal systems have at least two orders of government – central or "national" and regional (which may be called states, provinces or other

things[2]) – each of which is directly responsible to its population and has constitutionally defined responsibilities or powers to legislate that give it some genuine autonomy. Some federations are decentralized while others are centralized; some have few states and others have many; some have parliamentary regimes and others are presidential – congressional. There are dualist federations, which are those with limit the overlap in federal and state legislative powers and where each government administers its own programs, and integrated federations, in which the two orders can pass laws on many of the same subjects (with federal laws prevailing in cases of conflict) and where the states largely administer federal laws in these areas of concurrency. Even this distinction blurs in practice, with many federations having at least some elements of both types. In all federations federal governments make fiscal transfers to the states or share taxes with them. Central governments may use this "spending power" to apply conditions to such transfers and thereby influence the activities of state governments, even in areas outside federal legislative competence.

While such constitutional, fiscal and political arrangements are important for how a federal system actually operates, larger social, geographic and economic factors are obviously critical as well. Multi-ethnic religious or linguistic federations tend to have a more devolutionary political dynamic than more homogenous federations. The dynamics of a federation can change radically over time (pendulum swings between centralization and decentralization[3]) and they can confound the well-laid plans of constitutional authors (thus Canada has become devolved and Australia centralized – the opposite of their founders' intentions). Politicians at both levels compete for votes and promote policies in ways that may reshape the federal order quite dramatically. And to the extent that they are bound by rules, these may include not only the legal rules enforced by the courts but also what Owen Saunders, in his chapter, calls the "political constitution", which reflects a political consensus on the roles of the two orders of government.

21.2 FEDERALISM AND WATER MANAGEMENT

Water resources give rise to a whole variety of issues that must be managed by governments. These relate overwhelmingly to the *actual use* of the resource and to its physical management – who gets what share for what use, water quality, flood control, hydropower, and ecosystem sustainability – rather than to realizing economic rents, however potentially valuable these may be.[4] This gives water management issues a distinctive political character in that stakeholders are usually focused directly

on the resource itself, not on a second-order issue, such as revenue generation and sharing.[5]

Of course, the political saliency of water is often strongly tied to water scarcity and variability, which drive many water conflicts. Where water is surplus, the political pressure is usually lower, although issues such as hydro-power construction, flood control and pollution can be volatile.

The nature of the issues also differs: flood control and drought are about risk management, while supply is more about quantity. The political saliency of water varies greatly across regions because it is so largely tied to specific watersheds. Thus water issues usually have a strongly regional or local character, which has major implications for how the politics of water plays out in federal regimes.

The water policy community has a long-standing consensus in favour of integrated water resource management, especially within major river basins. This can be challenging to achieve across sectors because governments typically have had long established departments of agriculture, energy, industry, and health (and perhaps irrigation) to which departments of the environment are often relatively recent additions; each of these has its own agenda and stakeholder constituencies. If there is a water ministry, it often has quite a limited mandate, which is in strong contrast, for example, with some other sectoral ministries, such as those responsible for oil and gas, that have broad powers and a limited need to bring along other departments. So the push for IWRM (and for river basin authorities) has really been for a restructuring of governments in a way that would rebalance competing sectoral interests within a framework of sustainable and sound ecological practices. This has been tough enough to achieve in unitary regimes, especially when the political stakes are high, but it is an even greater challenge in federal systems, where there can be silos at two levels of government and weak intergovernmental arrangements for coordination.

21.3 THE ALLOCATION OF WATER-RELEVANT POWERS IN FEDERATIONS

There is a significant literature that sets out principles for allocating powers in devolved regimes.[6] Some cases are straightforward (thus public goods that are indivisible nationally, such as defence, should be provided by the central government), but many are not, because there is both a national and regional dimension to an area of responsibility. The concept of "subsidiarity", which has been popularized in the European Union, has severe operational limits: it calls for action by the centre only where

actions by the individual members of the union are not sufficient – but this is, of course, a highly subjective judgment. Moreover, populations in different federations vary in how much they prioritize their national identity versus regional or other group identities and these identity patterns shape views regarding the national and regional communities and the appropriate powers of the two orders of government.

Thus it should not be surprising that the constitutional allocation of powers relating to water in the nine federations under review shows no great consistency and varying degrees of coherence. Their constitution documents were written at very different times (ranging from 1789 for the United States to 1996 for South Africa) and with very different philosophies and styles of drafting. For example, the US Constitution has a very brief treatment of powers (it lists only 18 federal powers, most of which are concurrent with the states; the states are assigned "residual" powers that are not federal), while the Indian Constitution lists 97 central, 66 state and 47 concurrent powers in great specificity. The older constitutions of US and Canada make no explicit mention of "water" or "rivers", so the two orders of government get their powers over water from a variety of constitutional headings, ranging from the residual power in the US to natural resource powers in Canada, to trade and commerce powers and a grab-bag of individual powers in both countries. The US federation originated in the 13 colonies "coming together" to form a federation and part of its pre-federal history was a tradition of local control of resources. The same tradition applied to the original provinces of Canada. This emphasis on a strong state role has largely continued in both federations, even if the federal governments have substantial constitutional powers to intervene in water resource management, should they so wish and which they have occasionally drawn upon. Australia, which is the other long-standing federation under review, makes explicit the strong role of the states in that section 100 of its Constitution explicitly prohibits the federal government from abridging reasonable state use of rivers for conservation or irrigation.

In three of our nine federations, the central government is fully empowered by the constitution to manage water resources. In Mexico "lands and waters" are federally owned and the states have no constitutional authority over rivers or water; however, states can own significant water rights and land use is a municipal matter so effectively there is some diffusion of power. In Pakistan, the federal government is responsible both for international relations, including the critical Indus River Treaty, but also for the Pakistan Water and Power Development Authority, which centralized water infrastructure development in 1959; formal provincial constitutional authority is largely limited to local management of the irri-

gation system, but politically the provinces play heavily on water politics. South Africa has an "integrated" structure, where important legislative powers are almost all centralized or concurrent, limiting the provinces to legislating within federal framework laws (though they do have exclusive competence for potable water and sanitation services).

The constitutions of Spain and Brazil distinguish between rivers or watersheds under federal versus state competence. The Spanish Constitution of 1978 is designed to promote comprehensive watershed management by ensuring that the central government is responsible for river basins that extend into more than two autonomous communities (ACs), while AC governments are responsible for basins that are entirely within their territory. (Spain had a long history of major, multi-purpose water infrastructure projects.) By contrast, the Brazilian Constitution actually breaks up responsibility for watersheds because states are responsible for tributaries that are entirely within their boundaries even though they may flow into larger rivers that cross state boundaries and are thus a federal responsibility. Local water services are a municipal responsibility.[7]

The Indian Constitution gives the federal Parliament the power to assert legislative authority over some rivers. In India, "water" (including supplies, irrigation, canals, storage, power) is a state responsibility, but the union government may legislate on "inter-state" and international rivers (which is potentially a very broad power). (In Nigeria, the federal government has the exclusive right to legislate regarding water from sources Parliament may declare to affect more than one territory, while waterpower is a concurrent responsibility and local water services are a state responsibility.)

Powers related to treaties and spending have been of particular importance for water management in several federations. In most of these, the federal government has the power to enter into and enforce treaties, including those relating to international rivers. In some cases (such as Australia, which has no international rivers) the treaty-making power applies equally to internal rivers. Canada is an exception in that the federal government cannot bind the provinces by entering into a treaty that affects their competence (though it does have the power to enforce the old Imperial treaties which are very important for water resource management with the US). In some federations, the federal government's role is strongest in relation to international rivers.[8]

Most federations give the federal government the power to spend on any object, even those that are within the exclusive legislative responsibility of the states. This "spending power" can be very powerful in that federal governments use their fiscal resources to promote their objectives, often through jointly financed schemes in which federal grants are

conditional on state matching funds (in whatever proportion). Thus the spending power can extent the influence of federal governments, and even where there may be a federal power to legislate, proceeding by offering conditional grants may be more politically palatable than direct legislation or regulation.[9] In several of our federations the federal use of the spending power has been a key method of influencing water resource management.

This overview of constitutional arrangements focuses on the legal powers of the two orders of government in relation to water resources, not to their *actual use* of those powers, which is, as we shall see, quite different.

21.4 WATER POLICY FRAMEWORKS AND POLITICS IN FEDERAL SYSTEMS

Legal and "political" constitutions provide the basic rules in which a federation's politics are played. Politicians are typically vote maximizers or champions of certain groups, while voters themselves are often indifferent to constitutional arrangements if they do not conform to their political objectives. Thus both politicians and publics can be more focused on results or political advantage than on the niceties of the constitutional division of responsibilities.

In the spirit of integrated river basin management, a classic decision tree in a country would start with a national water policy framework that would set such principles as equity, efficiency and sustainability, define key objectives and projects and create or endorse the necessary institutional frameworks, including at the basin level. Such a framework would take account of the claims of different sectors and stakeholders, determine the balance between such claims, or create processes for resolving them. Few of the federations under review have approached this ideal and we can consider each case briefly:

- *South Africa* is perhaps the closest to the ideal, with a modern policy and integrated framework. It brought forward its national water policy and law in 1998, shortly after approving its new constitution in 1996. The need for a new policy framework was urgent to address the wrongs of the apartheid regime on water allocation, but also to push for widespread access to safe drinking water, while developing more sustainable ecological practices. The provinces, which had just been formed, were consulted on the policy and law, but its formulation was strongly led by the central government. Thus the policy framework is sound, but there remain serious challenges with implementation.

- *Spain* too, has a comprehensive and modern approach to water management. It has long had national water plans, but changing political and hydrological challenges required a new national framework, which the central government brought forth in 1993 and 2001. While these plans were quite comprehensive, they remained quite centralized in approach, with the central government offering major funding for strategic water infrastructure. Its most controversial proposals – for inter-basin transfers – caused tremendous political backlash in the donor regions and forced the central government to back down. The autonomous communities pushed for greater decentralization in water management, some of which was agreed politically and overturned by the courts. Thus while Spain has a modern approach to water management, it faces serious regional conflicts, some of which are unresolved. It has given new priority to an intense dialogue on water policy between its two orders of government.
- On the face of it, *Mexico*'s National Water Law, introduced in 1992 and subsequent policy initiatives, such as creating catchment area agencies, have created a relatively modern, integrated approach to water policy. The 13 river basin authorities, covering the whole country, are in place, but they are weak relative to the federal and state governments, which have significant conflicts among them. The federal government has been slow to respond so the system is not fully integrated and the lack of an agreed framework with the states is limiting the ability to address the serious over-exploitation of the water resource.
- *Brazil*'s division of constitutional authority, which distinguishes between federal and state rivers in the same watershed, had to be overcome if there was to be a coherent governance regime. The National Water Law was a major accomplishment in such a decentralized federation, which was only achieved with the consent of the states as well as the federal government. The new policy is quite comprehensive and provides an integrated framework that respects the roles of the two orders of government. Implementation has required considerable flexibility, as well as federal assistance through its spending power to even out administrative capacity between rich and poor states. The new mechanisms have even proven capable of dealing with a controversial inter-basin transfer.
- *Australia* is the driest continent and faces a water crisis. Traditionally the states led on water policy, but because of their inability to agree on a sustainable regime for the Murray–Darling Basin, by far the country's largest, the federal government moved into the central role

in creating a new governance and policy framework for the basin, which required the active cooperation of four states and the national capital territory, incentivized by lavish federal funding. Even so, pressure from the states and stakeholders has forced the federal government to make major adjustments because of problems of implementation and some major issues are still not completely resolved. The Murray–Darling policy led into a comprehensive national plan, "Water for the Future", costing A$13 billion.

- Water policy has always been a key priority in *Pakistan* because of the country's aridity and the dependence of the vast majority of its population on the Indus Basin. Authority over water development was centralized and the massive construction of the country's water infrastructure in the 1950s and 1960s was a signal accomplishment. The 1991 Water Apportionment Accord among the provinces resolved a major tension within the federation, though there are still conflicts and weaknesses around its application. While some agencies, such as the Water and Power Development Authority with its "Vision 2025", have plans that integrate various elements, there is no agreed national water plan. With the return to democracy such a plan is being discussed with the provinces, but the political system is weak and fragmented and the new plan is unlikely to resolve many of the challenges around flooding, irrigation, groundwater, drinking water and sanitation, and hydropower that need to be addressed.
- Water resource management in India has been far more decentralized than in Pakistan, with the states dominating irrigation and water services and the union government proving highly deferential to the states, even where it could claim constitutional authority. Within both the states and the union government, there are also major problems with departmental silos breaking up responsibilities for water. The union government has twice made modest attempts to develop national water policies and acts, but both foundered on the resistance of the states. The country's forums for developing coordinated union–state policies on water (and many other subjects) are weak and the party system at the federal level is not supportive. Thus despite the need to address major problems, the prospects for a comprehensive and cooperative approach is slight. Incremental changes, perhaps incentivized by union funds, are more likely.
- In Canada, which is well endowed with water in most regions, the federal government has been very modest in exercising its potentially significant powers over water resources. Water rarely attains much visibility in federal politics. The federal government made an attempt to develop a federal water policy in the late 1980s, but failed

to see it through. It appears likely the current government will not pursue its undertaking to develop such a policy (despite the rising need for federal leadership because of climate change and some inter-provincial disputes) and in its recent budget package ceded more responsibility over water to the provinces.

- Finally, the United States, which is the oldest federation, has gone through various phases in relation to water policy over 220 years, including swings of the pendulum from little federal intervention to virtual dominance and with issues such as irrigation, hydropower, water quality, flood control and environmental protection varying in priority and philosophical approach. However, at no time has there ever been a truly integrated national water policy and this may reflect the difficulty of aligning all parts of the federal government and Congress as much as deference to the states. The current approach is practical and responsive, with a strong emphasis on collaboration with the states.

The European Union, while not the subject of a chapter, merits mention because of its Water Framework Directive. The EU, which is a unique hybrid of federalism and confederalism with some characteristics of a treaty association, has a water directive that applies to all 27 member state and establishes standards for water bodies as well as for river basin planning. Implementation rests with member states, whose levels of compliance have varied considerably.

Nigeria, also not treated in this book, is a relatively water-abundant country, which is beginning to see issues of scarcity in some regions. The greatest water priority has been the supply of potable water, which is a state and municipal responsibility, though the federal government led the development of a National Water and Sanitation Services policy in 2000, shortly after the restoration of democracy. In 2009, the federal government brought forward a draft National Water Policy, which proposed a governance framework for river basins that includes the federal and state governments as well as stakeholders. While the federal government has clear constitutional authority over river management, consultations with the states and national assembly have been slow, so there is still no new law, three years after the policy was announced.

So what can we say of national water policy frameworks? Robust versions seem to have emerged because of a crisis that had to be addressed (Australia), or a strong consensus on a major reform by new power holders (South Africa), or a deep structural problem that could be addressed without disempowering anyone (Brazil). In all these cases, they included strong fiscal incentives from the central government and extensive

federal-state dialogue. By contrast, where centralized water policy frameworks have been driven by national governments (Mexico, Spain), they have been challenged by states and have needed revision, even if there were federal fiscal incentives. However, even the more successful national water policy frameworks were limited in scope, in that they typically focused on principles and processes, leaving many hard choices on such specifics as allocations, pricing, and major infrastructure for later resolution.

If need alone dictated the creation of a national water policy framework, both Pakistan and India would have them by now. But the depth of the conflicts, the weakness of their institutions and, in India, the states' jealous protectiveness of their powers over water has prevented the creation of such frameworks to date.

Canada and the United States have had the luxury of low saliency for water policy at the national level, so politicians have seen little need to develop national policy frameworks. In Canada and the United States, water issues are typically very regional, and power has historically been quite devolved. Canada's one attempt at a national water policy was half-hearted and never implemented, while the United States has never tried.

21.5 ARRANGEMENTS FOR RIVER BASIN MANAGEMENT COMPARED

The issue of how river basins are managed arises whether there is a national policy framework or not. Such frameworks can facilitate the development of river basin organizations, but they are not strictly necessary.

The water policy community has promoted watersheds as the appropriate scale for water governance. However, identifying watersheds is itself an act of choice given shifting understandings of hydrological boundaries and well as the nesting of watersheds within watersheds. Moreover, there is an asymmetry between watersheds and "problem-sheds" or "policy-sheds" (Cohen and Davidson, 2011) in that various jurisdictional boundaries will not match those of watersheds; this can be true even in unitary countries and especially so in federations.

The idea of special river basin management organizations is certainly not new: Spain's basin authorities date back to the 1920s, the very ambitious Tennessee Valley Authority (TVA) dates from the 1930s, and France has had river basin authorities since the 1960s; however, the adoption of the idea across federal systems has been remarkably slow. Of course, there is no one "model" for integrated river basin management, either in governance or mandate. Typically modern river basin organizations have representation by the relevant governments (and perhaps departments

within them) as well as stakeholders. Their functions can include water quality and environmental protection, water allocation and permits, water use charges, information systems, monitoring and inspection and capacity building. Some even have wider powers over infrastructure development, land use, hydropower, and flood control. Of course, not all of these functions need be done within a river basin so a key decision in any case is the scope of functions that an organization will have.

Of the nine federal systems under review, three have national laws providing for a comprehensive system of river basin management agencies for the whole country. In Spain, these agencies, which may fall under the jurisdiction of the centre or the autonomous communities (depending on whether the river basin encompasses multiple ACs), are well established, highly professional and have deeply entrenched processes of stakeholder participation. The South African water policy of 1998 called for river basin authorities in all the country's catchment areas, as did the Mexican federal government in 2004. However, implementation in South Africa has been slow and limited to some basins, in part because of capacity issues but also because of the difficulties of introducing effective stakeholder participation. In Mexico, national implementation has lagged and some states have created their own river basin authorities within the larger, national hydrological zones and their policies have sometimes conflicted with national policies.

Brazil's water policy provides for the possibility of interstate river basin committees on all its rivers, but to date there are only seven (plus 169 state river basin committees), all of which are in the more populated parts of the country. A key aspect of Brazilian policy is flexibility and recognition of the need for asymmetrical approaches, so the various committees vary in their composition, mandates and choice of instruments (such as water pricing). That said, the water policy provides a helpful framework within which these various arrangements are developed.

Australia and Pakistan are unusual in that for each of them one river basin is more important than all the others combined. The Indus Basin has over 90 per cent of Pakistan's population, while the Murray–Darling Basin straddles four of Australia's six states and the capital territory. Thus in each of these federations, there has been a national focus on a particular river basin and efforts to create mechanisms and policies to address the key issues in that basin. As difficult as they have been, the issues of the Murray–Darling have been more tractable in that the economic interests at play are marginal to the whole country and the federal government was prepared to pay the large fiscal price to buy a kind of peace, despite some missteps. Resolving the Murray–Darling led in due course to a broader national water policy; it also provided a possible template for managing other river basins in the country.

Pakistan faces bigger challenges. Early on, it did succeed remarkably in building the extraordinary infrastructure necessary to reroute vast quantities of water, following the Indus River Treaty. It also achieved a major, if imperfect, agreement on water allocation among its provinces. Increasingly, however, it risks being overwhelmed by the number of highly contentious issues that engage governments and stakeholders. These clearly go beyond any conceivable mandate for a river basin authority. The suggestion by Ahmad et al. (Chapter 15, this volume) that they be addressed by the Council of Common Interest – the country's highest-level political forum – is, in essence, simply a recognition that they must be addressed by the heads of the federal and provincial governments because of their importance. Once key decisions have been made, their implementation might be delegated to a river basin authority.

Pakistan's neighbour, India, has several major interstate river basins but nothing that resembles a river basin authority despite the existence, since 1956, of an act providing for their creation. It does have a mechanism for adjudicating disputes, but this is weakened by the lack of an adequate framework of guiding principles, procedural flaws and limited powers of enforcement. Integrated water resource management is also undermined by strongly siloed structures within the central and state governments, though this can be mitigated somewhat by administrative mechanisms for local coordination and the power of central funding for major projects.

The United States has no systematic approach to river basin management. Its policy-making is characterized by a combination of devolved arrangements worked out by the states within a basin and ad hoc federal responses to pressures and crises. The American system did create one of the most powerful river basin authorities ever: the Tennessee Valley Authority was established as an arm's-length agency with a broad mandate for truly integrated river basin management, including economic and social development (and an environmental approach that reflected its time). It is, in a sense, the exception that proves the rule in that both federal and state politicians resented their exclusion from so many important decisions and no subsequent river basin authority in the United States (or elsewhere) has had a similar mandate. More typical are the so-called compacts among states: these tend to focus on water allocation and can be flexible or brittle in design and they can involve the federal government both as a source of capacity and an arbiter. However, they fall far short of full-blown integrated riven basin management agencies and some, such as for the Colorado River, are clearly inadequate to the needs. In part, the limited mandates of such organizations reflect the fact that federal environmental laws and regulation obviate the need for basin organizations to address many issues of water quality (and the powerful functional agen-

cies will resist ceding authority). But more fundamentally, the politics of creating such agencies are not present: the states are too protective of their sovereignty (and often of the status quo rules), while the federal government sees little advantage in choosing sides, especially over controversial disputes on allocation, so it defers to the states.

This theme of federal deference is central to the Canadian story. The country is generally well endowed with water so that water issues, including river basin management, rarely have salience in federal politics. The federal government has been extremely reluctant to use its potentially significant powers to promote integrated management regimes, even in river basins, such as the Saskatchewan and Mackenzie rivers, that face serious issues around allocation and water quality. Basin arrangements are largely left to the provinces and have been limited in scope. Federal interventions have been most notable through environmental regulation, though even here the current government is moving to reduce the scope of federal regulation in relation to water quality and habitat protection. Its deference reflects an ideology of less federal intervention and less government generally, and perhaps a political calculation in favour of staying out of contentious inter-provincial issues.

Thus the federations under review span a spectrum from those that are clearly committed to river basin organizations to those that have little or no commitment. Even where there is a commitment, successful implementation is challenging; it requires extensive federal-state dialogue (even if federal powers are extensive),[10] flexibility in the design of arrangements for different basins (including in some cases delay in creating a basin organization), and, finally, very often the catalysing grease of federal financial incentives. It is also clear that there is a limit to the load of controversial issues that can be borne by river basin organizations: these function best when they are implementing established policies, with limited discretion on very politically contentious issues. Thus the river basins that are most in need of integrated resource management, such as the Indus in Pakistan or a number in India, face strongly competing claims that can only be resolved at the highest political level – whether by a (courageous) federal government imposing decisions or by developing a consensus among the key governments and stakeholders. Basin organizations and other water agencies can, if they have the capacity, aid understanding of the issues and options but they are unlikely to be able to resolve the issues themselves.

Some federations are failing to address the challenges of river basin management, whether through river basin organizations or through higher-level political decision-making. Occasionally a crisis, such as with the Murray–Darling, can create an environment where politicians must

address the issue, but very often the problems bubble along – recognized by key stakeholders and policy experts, but failing to engage the politicians, who see little advantage in taking on the challenge. This can represent a "failure" of federalism, but federalism in most countries is deeper than the constitutional structure – it is in the societal DNA.

21.6 NOTES

1. Argentina and Nigeria are the most notable omissions, in that they are both truly federal and have complex issues of river management (see Academias Nationales de Ciencias, esp pp. 105–114 and Goldface-Irokalibe). Russia and Venezuela are less truly federal, while Ethiopia has centralized management of its rivers, which are important for both irrigation and their huge hydro potential. The European Union is not a federation but its experience is highly relevant and is discussed in the Spanish chapters as well as this one.
2. For simplicity, this chapter will refer to "states" generically, but use whatever is the established term for particular federations. For an introduction to federalism see Anderson (2008).
3. Gerlak (2005) describes five eras of federalism in the US.
4. Hydro-power generation can be an exception, at least in that it can generate substantial rents. It is striking that there are no real cases in this volume of pricing water use primarily to realize economic rents, as opposed to recovering some costs of the water management system or to using pricing to help ration use; thus it is dramatically different from petroleum and other minerals, which are non-renewable and where there is a strong political focus on maximizing revenues from rents and then allocating them. See Anderson, 2012.
5. That said, the United States has had extensive discussions around the nature of benefits of major water projects (national, regional, state) and what this should mean for cost-sharing. The federal government assumes almost 100 per cent of the cost of flood control, but typically less than 50 per cent for navigation.
6. This is particularly true of the literature on fiscal federalism. Boadway and Shah (2009) are a good example. Political scientists tend to focus more on comparative experience (Watts, 2008; Majeed et al., 2005).
7. Brazil is one of the few federations that establish municipalities as an order of government with constitutionally defined responsibilities.
8. Argentina, which is not covered in this volume, also has a weak treaty power. For a comparative review of international relations in federations see Michelmann (2009).
9. On the spending power generally, see Watts (1999).
10. Ostrom (1990) argued that effective management of a common resource does not necessarily require decisions from above (Leviathan) but can be the result of cooperative and collective action. Our review suggests the limitations of both top down and consensual approaches in federations; success seems invariably to involve elements of both.

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