

THE *FUNDACIÓN NUEVA CULTURA DEL AGUA* AT THE INTERSECTION OF SCIENCE AND POLICY: A MODIFICATION OF THE EPISTEMIC COMMUNITIES FRAMEWORK

Jeanie Bukowski (Principal Investigator)*; Mikalynn Katlack*; Laura Doolin**

**Institute of International Studies, Bradley University*

***Committee on International Relations, University of Chicago*

Abstract: This paper considers the founding of the FNCA as an epistemic community. Specifically, it analyzes how research science on natural systems was translated into the normative beliefs and causal assumptions of the community, utilizing two models of the science/policy interface.

Key words: **water policy, new water culture, regime theory, epistemic communities, science/policy interface**

1. Epistemic communities as a transmission belt of science to policy

It is increasingly a normative assumption that science should contribute to environmental policy, given that science provides a means of understanding natural systems and human impacts on those systems (Steel, et al., 2004). In international regime theory, the epistemic communities framework provides a set of hypotheses regarding the conditions under which such a community can be a transmission belt of scientific knowledge into policy. An epistemic community is “a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue area” (Haas, 1992, 3). In addition to sharing a set of causal assumptions informed by scientific research about a particular phenomenon, the community also has “a set of normative and principled beliefs and a common policy enterprise” (Ibid.). The community then may transmit this consensus into the policy realm, as policymakers facing complexity and uncertainty in determining courses of action turn to the epistemic community. Knowledge becomes a valuable commodity under these conditions (Haas, 2002).

The *Fundación Nueva Cultura del Agua* (FNCA) may be identified as an epistemic community. The FNCA was founded in 1998 by academics and water professionals from a variety of disciplines with the purpose of bringing a discussion of sustainable water management to the Iberian Peninsula and opposing the traditional hydraulic paradigm. The community sees the problems of water quality and quantity, as well as more general damage to aquatic ecosystems, as stemming from the historical dominance in both Spain and Portugal of the traditional paradigm, which focuses on harnessing water through hydraulic infrastructure (especially in hydroelectric power generation and irrigation) in order to serve economic development. The FNCA has a very clearly articulated set of causal assumptions, normative beliefs, and a common policy enterprise, as indicated by its stated mission:

...to collect, integrate, generate, and transmit knowledge and human values in order to promote the adoption of the New Water Culture, understood as a *change of paradigm* toward environmental, economic, social, and cultural sustainability, oriented toward an ecosystemic and patrimonial consideration of water. This will be achieved through active participation in society and promotion to decision-makers of alternatives consistent with the New Water Culture.¹

Environmental problems are characterized by conditions of complexity and uncertainty, and generally require transboundary, international or even global cooperation in order to resolve

¹ <http://www.congresoiberico.org/index.php/mision-y-valores>. Translated by principle investigator, emphasis in original.

them through effective policy. Epistemic communities may influence or cause policy change or coordination through several hypothesized mechanisms, including simply identifying possible actions/outcomes for decision-makers or contributing to the creation of institutions and regimes at various levels of governance (Haas, 1992). The likelihood of influence increases in the face of external shocks, such as environmental or political crises that intensify the salience of the problem and create a perception of urgency among policymakers, and if members of the epistemic community are able to secure positions in relevant state, transboundary, or supranational institutions/regimes.

The epistemic communities approach assumes that scientific research is translated into “a shared set of normative and principled beliefs, which provide a value-based rationale for the social action of the community members” (Haas, 1992, 3). The epistemic community is then the transmission belt through which science informs policy. While this approach is valuable in its focus on this *transmission* of scientific knowledge to the policy arena, it is deficient in its failure to consider adequately the prior step: the *translation* of research science on natural systems into the shared normative beliefs held by the community. In this paper we seek to investigate systematically this prior step, assuming that the *translation* may have implications for the ability of the community to carry out its policy enterprise. Drawing from the literature on the science/policy interface, we develop models specifying the interaction between science and politics in the realm of environmental policy. Through the lens of these models, we analyze the translation of science into shared beliefs in the case of the FNCA. This study will broaden our understanding of the circumstances under which expert communities may impact policy, as well as provide a useful modification to the epistemic communities framework.

2. The science/policy interface literature and models of translation of science into normative and principled beliefs

There is a burgeoning literature on the role of science in environmental policy making. One key point of disagreement in this literature is whether or not the processes and rules of science are significantly different from those of politics. How one answers this question has implications for both the empirical and normative assumptions regarding the science/policy interface. If positivist assumptions of science are maintained, then science is the closest humans can get to knowledge or “truth,” and policy is best served when science is walled off from politics in order to safeguard scientific objectivity. If constructivist assumptions prevail, then it is impossible to separate the human endeavors of politics and science and doing so creates a false dichotomy; in the policy realm, we then must understand science and politics as co-produced, and reciprocal influence of scientists and stakeholders is necessary to achieve better policy. Some studies seek to bridge these two opposing views through, for example, analyzing and recommending the use of scientific assessments or institutional structures that can bring the science and policy communities together effectively. Elsewhere, we have portrayed several of the science/policy interface models as lying on a continuum between opposed endpoints, *Fortress Science* and *Co-production* (Bukowski, Doolin and Katlack, 2013). This representation of intervals between the continuum endpoints captures the various and nuanced arguments in the science/policy interface literature. For purposes of the current case study, however, we focus in our analysis on only the two endpoints, to allow a broad initial evaluation of the FNCA case.

2.1 The Fortress Science model

The first model of science is associated with Enlightenment ideals and positivism. “Normal,” “traditional,” “orthodox” scientific inquiry is seen as involving a theory-grounded testing of hypotheses through the collection, observation, and analysis of empirical data. In this view

science is incremental and cumulative, replicable, and “self-correcting” through the peer-review process (Dessler and Parson, 2010; Le Treut, et al., 2007). Its practitioners and much of the general populace consider it as the procedure through which humans can come closest to a value-neutral search for “truth” (which in scientific terms means achieving high confidence in the evaluation of a particular phenomenon). It is “at its best a *social enterprise*” since “every researcher or team of researchers labors under limitations of knowledge and insight, and mistakes are unavoidable, yet such errors will likely be pointed out by others” (King, Keohane and Verba, 1996, 9, emphasis in original). In its cumulative nature, science is assumed to further knowledge and human progress.

In this view, the motivations of participants and the rules of acceptable argument are very different for scientists and politicians (Skodvin and Underdal 2000). The scientific process dictates that participants exercise caution. The rules of policy argument are much looser, so policy advocates and their supporters exaggerate, use selective or biased claims, appeal to emotion, and engage in personal attacks. In politics the rules of the game are more lenient because people care most about what the benefits of the politician’s actions are to them, and also because politicians’ constituents may not have enough specialized knowledge to understand the difference between sound scientific arguments and deceptive rhetoric. In order to prevent the influence (assumed to be undesired) of politics on science, then, the positivist view tends to recommend that barriers be placed between the two disciplines. To the extent possible, science should be walled off from politics. Scientists should be allowed to pursue questions of intrinsic interest through their own rules, and then policy-makers, corporations, and others would be informed by this objective information if they choose to use it.

While recognizing that the ideal of positivist science is not always perfectly upheld, advocates of what we are referring to here as the Fortress Science model present empirical evidence that real science is close enough to the ideal to merit protection from politics. Their normative claim is that science serves politics best by providing independent, objective knowledge on natural systems and human impacts on those systems. This is largely because if scientists enter politics as direct participants and advocates they may lose credibility and respect both within and outside their own community, thus detracting from the value of their research for policy. It is also because most scientists are not trained in the workings of the policy process, and so would not be effective policy-makers even if they seek this role (Steele et al., 2004).

2.2 The Co-production model

The opposing model has at its base a constructivist critique of traditional science. Kuhn’s work (1970) often is used as a jumping-off point to challenge the assumption that science is a dispassionate, self-correcting, and cumulative progression to ever-greater knowledge. Under rubrics such as the sociology of scientific knowledge (SSK) and science and technology studies (S&TS), these approaches assume that science has no special status and should be understood in the context of the same social and power relations that drive politics. Latour (1988), for example, argues that scientists have been able to “actively modify” society by redefining phenomena considered important to society and thereby displacing other actors and elevating their own significance. Networks of scientists and their backers are able to construct consensus on what is considered to be factual and relevant, thereby excluding other actors and views. While not going as far as Latour in the denial of any special status for science, other empirical work critiques the peer review process as biased along a variety of dimensions including gender, and/or focuses specifically on the funding of scientific research as biasing that research, introducing political or commercial agendas, or limiting the research questions to be considered.

In her influential work in science and technology studies, Jasanoff develops the concept or “idiom” of co-production as a framework of analysis for the science/policy interface:

...co-production is shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it...Scientific knowledge, in particular, is not a transcendent mirror of reality. It both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments and institutions—in short, in all the building blocks of what we term the *social*... Co-production can therefore be seen as a critique of the realist ideology that persistently separates the domains of nature, facts, objectivity, reason and policy from those of culture, values, subjectivity, emotion and politics (Jasanoff, 2004, 2).

Orthodox scientific claims about environmental degradation thus should be understood in the political context within which they were developed, and a reconsideration and critique of these claims then may “contribute to more locally determined forms of environmental management” that might otherwise be contravened by a reliance on global scientific “truths” (Forsyth, 2003, 276). Normatively, advocates of this model are most concerned not with the contamination of science by politics, but rather by the possible “tyranny of science” (Feyerabend, 2011) and the potential of science to undermine democracy.

3. Evaluation of the FNCA case through application of the two models

The FNCA, as indicated above, has a very clearly stated set of normative and principled beliefs and a common policy enterprise, developed at the time of the founding of the organization. The primary question we are asking in this paper is how scientific research on natural water systems was *translated* into these normative beliefs. Was there a clear effort, in developing these causal assumptions and normative goals, to maintain the integrity of the research enterprise as separate from, more objective than, and thus more legitimate for, the political enterprise (fortress science)? Or do the assumptions and goals represent the active co-production of science and policy? In order to answer this question, we draw on 1) a brief description of the founding of the community; 2) an aggregate characterization of the founding membership; 3) an aggregate characterization of scientific work crucial to the science/policy interface; 4) semi-structured interviews with eleven key FNCA members, many of whom have been involved in the organization since its founding in 1998.²

3.1. The founding of the FNCA

The formation of the FNCA and the constitution of its goals can be attributed to the active efforts of its founders. Their actions were made possible, however, within the context of a unique set of circumstances involving a variety of actors at levels from the local to the supranational. The traditional hydraulic paradigm, with its emphasis on augmenting supply through state controlled and subsidized large-scale infrastructure projects, has long been an integral part of water policy on the Iberian Peninsula. Modern efforts to harness water as a resource for development came to fruition in Spain under the Franco regime, when the state became a “master socioenvironmental engineer,” (Swyngedouw, 1999, 456), increasing the country’s hydraulic capacity by 1.000 hm³ per decade. This policy has been debated particularly since Spain’s transition to democracy, in the wake of a period of severe drought in central and southern Spain in 1991-95, and in light of negotiations at the European level beginning in 1996 that produced the 2000 Water Framework Directive (WFD).

The primary purpose of the first post-transition water law in Spain, the 1985 Water Act, was to modernize the legal framework for water policy. The law declared groundwater to be part

² These interviews were carried out in Spain in May-June 2013.

of the public domain, linked water quality and environmental protection to water policy, incorporated European Community (EC) water quality directives, and required the Spanish parliament to carry out national hydrological planning (Bukowski, 2007). It also recognized the authority ceded to the Autonomous Communities in the 1978 Constitution and subsequent decentralization process, which resulted in shared water competences. Pursuant to the 1985 legislation, the Socialist (PSOE) government in 1993 presented its first draft National Hydrological Plan (PHN) for consideration. At the heart of the plan were large-scale water transfers from the north and west to the south and east, the building of 150 new dams, and a state investment plan designed to increase Spain's regulated water resources by over 6.000 hm³ a year. Thus the basic tenets of the traditional hydraulic paradigm were continued. Moreover, the draft PHN created a crisis in Spanish-Portuguese relations, as the latter had not been consulted regarding these modifications to transboundary river basins.

The mobilization of civil society in response to the 1993 PHN was most pronounced initially in the areas that would be impacted negatively by the water transfers, such as in the Ebro river basin and in the Aragón region. In 1995 Greenpeace Spain and the environmental umbrella group CODA (Coordinator of Environmental Defense Organizations) initiated the formation of COAGRET (Coordinator of Those Affected by Large Dams and Water Transfers) to bring together activists, stakeholders, and water experts from the various regions to pose a united front against the PHN. Several of the academics who would later be involved in the formation of the FNCA were also instrumental in forming COAGRET.³ Ultimately, and for a variety of reasons including intense public debate domestically (Bakker, 2002) and a political storm across the border in Portugal, the PHN was defeated in both houses of the Spanish parliament in 1995.

The conservative People's Party (PP), elected in 1996, had criticized the PSOE's inability to overcome the PHN impasse and came into office promising, through the newly-created Ministry of the Environment (MIMAM), to achieve approval of a national plan. The main vehicle for this approval was to be "enhanced dialogue" supported by the 1998 *Libro Blanco de Agua* (White Paper on Water). The *Libro Blanco* was, as promised, a comprehensive document detailing the problems facing the Spanish hydrological system. The Ministry then presented a new draft of the PHN in September 2000, which appeared to reject much of the consensus developed in the *Libro Blanco*—as well as the provisions of the EU Water Framework Directive—and to return to state-controlled, supply-led solutions. The new draft reduced the volume of transfers contained in the 1993 proposal by about half, concentrating on transfers from the Ebro river basin to the Mediterranean basins, and eliminating transfers from the Tagus and Douro basins contained in the 1993 proposal (and which are shared by Portugal). Despite this reduction, the plan still envisaged the construction of 120 reservoirs and more than 1000 kilometers of canals and pipelines. At €24 billion (about a third of which the PP hoped to cover with EU funding), it would have been the most expensive infrastructure project in Europe at the time. Even though the Plan maintained marketization efforts (Bakker 2002) and introduced some measures for the protection of natural resources, it was dominated

³ For example Pedro Arrojo Agudo, Professor of Economic Analysis and Francisco Javier Martínez Gil, Professor of Hydrogeology, both at the University of Zaragoza, were instrumental in founding both COAGRET and the FNCA (Arrojo Agudo was the first president of both organizations). Martínez Gil is also credited with first conceptualizing the New Water Culture through his 1997 book, *La nueva cultura del agua en España* (Bilbao: Bakeaz).

by principles of the traditional paradigm—i.e. a command and control system planned, financed and operated by the state.

As part of the proposed dialogue specified in the *Libro Blanco*, MIMAM (specifically the Secretary of State for Waters and Coasts) invited more than 100 academics from a variety of disciplines to write 10- to 15-page reports on the PHN based on their own research. When many of these reports turned out to be critical of the PHN, however, MIMAM made the decision not to make the reports public. The PHN was approved by the PP-dominated legislature in 2001 (Law 10/2001), with little of the public debate promised. In 1996, several academics from various disciplines whose research focused on aspects of water and water policy had begun planning for the first transboundary Iberian Congress on Water Management and Planning (*I Congreso*), to be held in 1998. One of those academics, Pedro Arrojo Agudo, economist at the University of Zaragoza (see footnote 3) asked the environment ministry for a list of the experts who had been invited to submit reports, but MIMAM refused his request. As a prominent member of the academic circle of water experts, however, Arrojo was able to ascertain the majority of contributors. He asked them directly for their reports and published 41 of these reports as an edited volume in 2001 (Arrojo Agudo, ed.).

An increasingly vocal opposition to the 2000 PHN, including national and European environmental groups, consumer groups, and business interests favoring marketization, mobilized against the proposed water transfers. COAGRET's strategy was to organize umbrella "Platforms" in affected basins (such as the *Plataforma por la Defensa del Ebro*). The Platforms in turn organized very large civil society protests in Madrid, Zaragoza, and Barcelona between 2001 and 2003, by some counts mobilizing a total of over a million people. In September 2001, organized by The Ebro Defense Platform, SEO/Birdlife, and COAGRET, somewhere between five and 15 thousand people marched in Brussels against the Spanish PHN under the banner "Marcha Azul" (Blue March), and representatives from these organizations presented their complaints before the European Commission and the European Parliament (La Marcha Azul..., 2001).

This opposition was supported by, and at times also generated by, academia. The 1998 Iberian Congress in Zaragoza, prepared, as discussed above, by academics from a variety of disciplines and supported by 70 Spanish and Portuguese universities, specified as its theme *El agua a debate desde la Universidad. Por una Nueva Cultura del Agua* (The water debate from the University perspective. In Favor of a New Water Culture). This academic conference, somewhat surprisingly to its organizers, yielded a general consensus statement. The organizing committees for the *I Congreso* then formally constituted the FNCA as a transborder non-profit entity a few months later, with 102 individual founding members and 11 institutional founding partners.

3.2. Characterization of FNCA founding membership

An epistemic community consists of professionals who have expertise in a particular domain and are authoritative in their knowledge of that policy area. The type of professionals prevalent in the network is likely to have an impact on how the group translates research science into normative goals. It is reasonable to assume, for example, that if a community has a preponderance of members with advanced degrees who themselves produce traditional scientific research in a university setting, then that community would tend more toward a fortress science position, as opposed to a community made up primarily of industry specialists and/or NGO activists. An aggregate profile of the FNCA founding membership thus is useful

in identifying a potential tendency toward one of the two models. Table 1 specifies the academic disciplines and highest level of education for the 102 founding members. Table 2 indicates their professional affiliations.

Table 1: FNCA Founding Members (Total 102)
Academic Fields in Highest Level of Education: (Total 103)

		Ph.D.	MA/ MS	
Sciences		24	8	32
Biology/ Ecology	21	14	7	
Hydrology/ Geology	5	5	0	
Physics	4	4	0	
Chemistry	2	1	1	
School of Business		10	1	11
Economics	10	9	1	
Business	1	1	0	
Social Sciences		16	1	17
Geography	9	9	0	
Sociology	3	3	0	
Anthropology	2	2	0	
History	2	2	0	
Philosophy	1	0	1	
Engineering		12	7	19
Law		1	1	2
Professional		3	1	4
Education	1	0	1	
Agriculture	2	1	0	
Medical Sciences	2	2	0	
Unknown				18

Table 2: FNCA Founding Members (Total 102)
Professional Affiliations/Job Categories (Total 107)

University Research and/ or Teaching		60
Government		17
International	1	
National	8	
Regional	5	
Local	1	
State-owned water company	2	
NGO		6
NGO/ Environment	4	
NGO/ Other	2	
Private Law Practice		1
Private Sector/ Environment-Water Resource Management		4
Private Sector-Other		7
Secondary Education	2	
Writer/ Environmental Activist	1	
Engineering	2	
Agriculture	1	
Medicine/ Research	1	
Unknown		12

Source: <http://www.unizar.es/fnca/index3.php?pag=8&id=1>, elaborated by authors. For both Tables 1 and 2, the discrepancies between the total number of FNCA founding members, their academic fields and professional affiliations is due to the fact that some members have degrees in more than one field and/or more than one professional affiliation.

As demonstrated by the Tables, the academic and professional profile of the FNCA at its founding would indicate a tendency toward traditional science, given the disciplines

represented as well as the level of education (79% of members for which information is available hold Ph.Ds.) and professional status (67% hold university research/teaching positions).

3.3. The science behind the new water culture: characterization and analysis of *I Congreso* keynote papers and PHN reports

Ernst Haas, the scholar most associated with the epistemic communities approach, argues that “...science remains influential if its expertise and claims are developed behind a politically insulated wall” (Haas, 2004, 587), implying for our purposes that whatever the normative assumptions and goals of the epistemic community, these must be translated from traditional science, “uncontaminated” by politics, in order to be seen as legitimate. Was this the case during the constitution of the FNCA as an epistemic community?

Part of the answer to this question can be derived from an analysis of two sets of academic work crucial to the founding mission and normative goals of the FNCA. The first set contains papers presented at the *I Congreso Ibérico sobre Planificación y Gestión de Aguas* in Zaragoza in 1998. For purposes of the current paper, the 45 keynote symposia papers are considered.⁴ The second set consists of 41 of the reports on the PHN solicited by the PP government in 2000, subsequently suppressed, and then published in 2001 (Arroyo Agudo). The summary data for these reports and papers, including the disciplinary perspective from which they were written as well as a characterization of the authors, is presented in Tables 3 and 4, below.

Table 2: 1st Congreso Ibérico sobre Planificación y Gestión de Aguas, Keynote addresses at Symposia

<i>Academic Discipline</i>	<i>No. of Papers</i>	<i>No. of Authors</i>	<i>No. of Ph.Ds.</i>	<i>No. of Senior Univ. Researchers*</i>	<i>Founding members FNCA</i>	<i>PHN Expert Report</i>
Engineering	12	19	12	12	5	6
Economics	7	13	11	6	1	2
Law/Policy	7	7	4	3	1	1
Biology/Ecology/Earth Sciences	6	6	6	3	2	0
Sociology/Political Science	3	4	4	3	0	0
Geology/Hydrology	2	2	4	2	2	2
Anthropology	2	2	2	1	1	1
Public Health	2	3	2**	3	0	0
History/Geography	2	2	2	2	2	0
Philosophy of Science	1	1	1	1	0	0
Architecture	1	1	1	1	0	0
Totals	45	60	49	37	14	12

*Defined as Full or Research Professors

**One of these authors has an MD

Source: Proceedings of *I Congreso*, http://grupo.us.es/ciberico/archivos_html/index.htm. Elaboration by principal investigator.

⁴ The scientific committee for the conference specified seven themes for the conference symposia. In addition to the keynote papers/presentations for each symposium, 98 additional papers were presented, also under these seven themes.

Table 3: Expert Reports on 2000 Draft PHN Solicited by MIMAM

<i>Academic Discipline</i>	<i>No. of Reports</i>	<i>No. of Authors</i>	<i>No. of Ph.Ds.</i>	<i>No. of Senior Univ. Researchers*</i>	<i>Founding members FNCA</i>	<i>Keynote at I Congreso</i>
Engineering	12	12	11	11	3	5
Biology/Ecology	11	13	11	8	4	1
Geology/Hydrology	7	7	7	6	4	2
Economics	5	5	5	4	2	2
Geography	3	6	6	6	1	0
Law	2	2	1	1	0	1
Anthropology	1	1	1	0	1	1
Totals	41	46	42	36	15	12

*Defined as Full or Research Professors

Source: Arrojo Agudo, 2001. Elaboration by principal investigator.

The experts who presented the Keynote papers at the *I Congreso*, as well as those solicited by the government to provide evaluation reports of the PHN, were recognized scholars in their fields. In the case of the Keynote papers, 82% of the paper authors (49/60) held Ph.Ds. in their disciplines, and 62% (37/60) were senior scholars/researchers. In the case of the PHN reports, 91% of the report authors (42/46) held Ph.Ds. with 78% (36/46) being senior academics. These experts represent the full range of disciplines relevant to water management. Considering both sets of academic work, a little over a quarter (24/86) of the reports/papers originate from the field of engineering. Given the traditional dominance of water policy in both Spain in Portugal by engineers, this is not surprising. 20% (17/86) of the work was done from a biology/ecology perspective, and 14% (12/86) from economics. There is some overlap in both sets of work, with 20% (12/60) of the *I Congreso* authors also contributing to the PHN reports. Moreover, 23% (14/60) of the *I Congreso* Keynote authors were founding members of the FNCA, as were 33% (15/46) of the PHN report authors. Four of the founding members of the FNCA presented a keynote paper at the *I Congreso* and submitted a report on the PHN for publication.

As we see in the aggregate data, the *I Congreso* Keynotes brought together established scholars in a variety of disciplines, drawing from their ongoing research. The consensus statement emerging from the *Congreso* included the following conclusions regarding the extant state of affairs (FNCA, 1998):

- The 1993 draft Spanish PHN proposed by the PSOE government, as well as the PP's 2000 draft PHN, were fundamentally a continuation of the Regenerationist paradigm, i.e. large publicly-funded hydraulic infrastructure projects to increase water supply, particularly inter-basin transfers and irrigation infrastructure. Portuguese water policy and planning can be characterized similarly. These Plans, and the traditional hydraulic paradigm, have been driven and supported by strong vested economic and political interests such as the construction, hydroelectric power generation and irrigation industries.
- The negative impacts of the traditional paradigm and model of development are empirically demonstrated. These include: deteriorating water quality and quantity in the majority of Spanish and Portuguese rivers, aquifers, wetlands, lakes, etc.; pollution of these water sources (especially diffuse agricultural pollution) and associated ecosystems and habitats; deforestation; introduction of invasive species; eutrophication of water sources; threats to biodiversity; damage to estuarine and littoral ecosystems; salinization of fresh water systems.
- These impacts on natural systems in turn have negative economic, health, quality of life, and esthetic effects for human systems.
- The traditional paradigm demonstrates economic irrationality, for example, "ruinous balances" demonstrated in economic cost-benefit analyses of irrigation in the Spanish interior regions. That is, public investment is driven by the goal of ever-increasing supply rather than by economic rationality or efficiency.
- There exists a lack of sufficient regulatory policy at all levels of governance, as well as insufficient enforcement of existing policy.
- There exists a lack of citizen and civil society participation in water policy at all levels.

Given this evaluation, the consensus document also contained several recommendations, including the following:

- The legislative and normative framework for water planning and management should recognize the full value of aquatic ecosystems, and thus promote compromises on sustainable use of resources based on the functional unity of the river basins.
- It is necessary to preserve the few natural river flows that remain on the Peninsula.
- Flow regimes should be established in the modified rivers that approximate what would be the natural flows, reaching local compromises among environmental objectives and urban, industrial, and agricultural uses in each area.
- The system of water concessions, especially for hydroelectric uses, should be modified.
- The natural functionality of rivers and associated ecosystems should be recovered not only to counter the risk of floods, but also to protect their biological functions, the environmental services that they provide, the scenic values they contain, and their recreational and leisure use potential.
- It is necessary to establish parameters and criteria for sustainability in the case of overexploited aquifers.
- The control and improvement of water quality should be based on the application of biological, and not just physical-chemical, parameters, as specified in the Water Framework Directive being negotiated at the time.
- Policy should focus on curtailing demand, including a reconsideration of the price structure of water use to better reflect its true value, and investment in technological advances (e.g. modernization of irrigation systems) and education.
- The river basin authorities should be reformed to guarantee both the professional expertise and political will necessary for the above recommendations to succeed.
- Civil society participation of all relevant stakeholders at all levels should be guaranteed.

The FNCA's normative goals as stated in its Mission are certainly derived from both the empirical conclusions and policy recommendations of the *Congreso* consensus:

We are professionals from different fields (academic, business, cultural, social, etc.) who, through scientific knowledge and with social awareness, defend a New Water Culture. In the New Water Culture Foundation we work to recover aquatic ecosystems (springs, rivers, waterfronts, lakes, wetlands, etc.) that are the highest expression of life on our planet. We defend the recovery of the patrimonial, cultural, emotional, esthetic and recreational value of our rivers in a society that has confused progress with commerce. We believe a New Water Culture directed at environmental sustainability is necessary. It is therefore essential to introduce profound changes in our hierarchy of values and in our way of life. We need an ethos that reorients our social relations around the uses and the perception of water and around nature more generally.⁵

4. Translation of science into the normative beliefs of the FNCA: discussion and conclusions

This initial analysis of the creation of the FNCA's normative beliefs shows that these goals were based firmly on the cumulative expertise of the foremost academic experts across the disciplines most relevant to water management. Indeed, it was these recognized experts to whom the PP government turned in their request for scientific evaluations of the PHN. The FNCA also reached out to established experts in the various fields for the Keynote papers at the *I Congreso*, and the consensus conclusions were derived from the scientific work presented. The founding membership of the FNCA also has a profile favoring traditional scientific research. Moreover, while some of the founding members of the FNCA produced PHN reports and/or *Congreso* Keynotes, the majority of the reports and papers—and thus the scientific research translated into the FNCA's normative beliefs—was generated outside the foundational membership of the FNCA, implying its independence from the goals of the community. At first glance, then, the translation of science into the epistemic community's normative beliefs would be expected to tend toward the Fortress Science model.

⁵ <http://www.congresoiberico.org/index.php/la-fundacion>. Translated by principal investigator.

When we move beyond the aggregate data to explore the motivations and actions of the key actors involved in the founding of the FNCA, however, the picture becomes more complicated. As discussed above, several of the academics who were the driving force behind the formation of the FNCA were also founders, previously, of more explicitly activist organizations such as COAGRET, and in interviews carried out for this study, indicate their long-standing commitment to environmental activism. These academics had critiqued the traditional hydraulic paradigm as early as the 1970s from various disciplines, particularly economics, sociology, ecology, and hydrogeology (Gómez Fuentes, 2010). Many also were linked to environmental movements throughout Spain, particularly in the Ebro river basin. Their perspective was influenced by comparisons with cases of water management in the US and elsewhere in Europe, and FNCA founders on both sides of the border were supportive of the negotiations leading to the European Water Framework Directive. Indeed, in a symbiotic relationship, the WFD was crucial in adding legitimacy to the new water culture movement on the Iberian Peninsula.

Several of the founding members also share a skeptical attitude toward traditional positivist science. The consensus document from the *I Congreso* states explicitly this skepticism:

Given the current institutional predominance of civil engineering [in water management], other scientific perspectives tend to be ignored, and non-positivist paradigms are especially devalued. This generates a certain tyranny of the quantitative that elevates numerical data to the category of absolute truth and rejects, or at best devalues, other forms of qualitative knowledge that aspires to comprehend the social and cultural realities that underlie social conflicts emerging from hydraulic projects. Without degrading the necessary contribution of quantitative analyses, an effort should be made to develop the work of research, planning, and management of water in an interdisciplinary manner, which will undoubtedly contribute to a better understanding of the complex social, economic, environmental, and technical reality in which we find ourselves (FNCA, 1998).

FNCA members interviewed consider scientific credibility to be crucially important to the mission of the community. They also value diversity in both the consciously interdisciplinary nature of their effort and in diverging scientific approaches and political opinions of the membership. For several of the key founding members, however, the ideals of positivist science have been used primarily as a strategy to enhance the legitimacy of the community. Launching from the platform of scientific consensus achieved in the general opposition to the PHN, and vindicated from the supranational level by WFD principles and requirements, these members have the larger goal of shifting the conceptualization of “objective” science and acceptable policy in the area of water management. We can draw parallels with Waterton and Wynne’s analysis of the European Environmental Agency’s (EEA) approach to scientific information, with EEA members using “a thoroughly encultured and explicitly ‘pro-environment’ normative model” in re-defining concepts such as environmental risk (2004, 94). Information in this case is “invested with *meaning*, which needs to be inspired by its ultimate purposes, *environmental improvement*” (Ibid., 101, emphasis in original). In order to serve the policy order with appropriate knowledge, then, the scientific community inevitably must help to formulate that order. For the FNCA the meaning of “objective” science is thoroughly tied up in the normative goals of the new water culture, as an antidote to the “un-objective, anti-scientific, pro-industry” goals of the old hydraulic paradigm. Many of its members are engaged actively in building a post-traditional-hydraulic-paradigm policy order, at the same time that they produce and marshal scientific evidence that supports the new water culture that they are promoting.

There is no question that positivist scientific research, in a variety of relevant disciplines, has played an important role in the legitimation of the new water culture movement. It is equally clear, however, that key FNCA founders have spearheaded an effort to translate that science

into the normative goals and causal assumptions of the community in a way that is more consistent with the co-production model. They have sought to shift the parameters of the debate by re-conceptualizing the natural and social order within which scientific knowledge plays a role—for example in the integrated approach to river basin management that considers cultural and esthetic values of water on par with economic ones. The scientific evidence on, for example, damage to aquatic ecosystems resulting from damming a river, is utilized in the *production* of a new policy order that would consider such damage unacceptable, and would value further scientific research focusing on how to reverse it.

The question still to be asked is what the implications of the translation of science into the normative beliefs of an epistemic community are for that community's ability to carry out its policy enterprise. That question is beyond the scope of the current paper, but some initial propositions may be suggested. In an initial look at the evolution of the FNCA since 1998, we note a tension within the community itself between those members who on the one hand see the FNCA's primary role as a provider of scientific knowledge to decision-makers or river basin NGOs, and on the other hand those who want the expert community to take a more directly activist position in society and government. Some interviewees, for example, lamented what they see as a shift in profile of the FNCA membership that makes its orientation "less scientific and more activist" than at its founding. Another point of contention has been the role played by the FNCA when it found itself with the opportunity for direct access to the environment ministry during the first Zapatero administration (2004-2008). The members taking advantage of this access considered the strategy to be a "pragmatic" one that contributed to a political victory in the cancelling of the Ebro basin transfers. Others, on both the right and the left of the political spectrum, claimed that this access compromised the legitimacy and integrity of the FNCA, which in turn weakened its overall ability to influence policy in the longer run. There is near consensus among interviewees that the FNCA has been less effective in its policy enterprise since 2008.

This case illustrates a dilemma previously unrecognized in the epistemic communities literature that merits further attention: Change in the policy order sufficient to allow an epistemic community to have political influence may necessitate a co-productionist translation of science into the community's normative and principled beliefs. At the same time, however, active co-production runs the risk of decreasing potential policy influence if the community's expertise and claims of science are seen by decision-makers, society, and members of the community to be inadequately walled off from politics.

Bibliography

- Arrojo Agudo, P. (ed.) (2001): *El Plan Hidrológico Nacional a debate*, Bilbao, Bakeaz.
- Bakker, K. (2002): "From state to market? Water *mercantilización* in Spain", *Environment and Planning A*, vol. 34, 767-790.
- Bukowski, J. (2007): "Spanish water policy and the National Hydrological Plan: An advocacy coalition approach to policy change", *South European Society & Politics*, vol. 12, no. 1, 39-57.
- Bukowski, J., L. Doolin, and M. Katlack (2013): "Science into policy: A reevaluation of epistemic communities in the Iberian transboundary water management regime", paper presented at the Midwest Political Science Association Annual Conference, 11-14 April 2013.
- Dessler, A. and E. A. Parson (2010): *The Science and Politics of Global Climate Change: A Guide to the Debate*, 2nd ed, Cambridge, UK, Cambridge University Press.
- Feyerabend, P. K. (2011): *The Tyranny of Science*, Cambridge, UK, Polity Press.

- FNCA (1998): Documento síntesis de reflexiones, acuerdos básicos y propuestas del primer Congreso Ibérico sobre Planificación y Gestión de Aguas, http://grupo.us.es/ciberico/archivos_acrobat/zaragozaconclu.pdf accessed 10 August 2013.
- Forsyth, T. (2003): *Critical Political Ecology: The Politics of Environmental Science*, London and New York, Routledge.
- Gómez Fuentes, A.C. (2012), “La nueva cultura del agua: origen y análisis de sus principales ideas y propuestas”, Primer Congreso Red de Investigadores Sociales Sobre Agua, 18 and 19 March 2010.
- Haas, P. M. (1992): “Introduction: epistemic communities and international policy coordination”, *International Organization* 46, n°1, 1-35.
- Haas, P. M. (2002): “Epistemic communities and the dynamics of international environmental co-operation”, in V. Rittberger (ed.): *Regime Theory and International Relations*, Oxford: Oxford University Press, 168-201.
- Haas, P. M. (2004): “When does power listen to truth? A constructivist approach to the policy process”, *Journal of European Public Policy*, vol. 11, n°4, 569-592.
- Jasanoff, ed. (2004): “The idiom of co-production,” in S. Jasanoff, ed., *States of Knowledge: The Co-Production of Science and Social Order*, London, Routledge, 1-12.
- King, G., R. O. Keohane, and S. Verba (1996): *Designing Social Inquiry: Scientific Inference in Qualitative Research*, Princeton, NJ, Princeton University Press.
- Kuhn, T. S. (1970) *The Structure of Scientific Revolutions*, 2nd ed. Chicago, University of Chicago Press.
- “La ‘Marcha Azul’ llega a Bruselas para pedir a la UE que no financie el PHN”, *El País*, 9 September 2001.
- Latour, B. (1988): *The Pasteurization of France*, Cambridge, MA, Harvard University Press.
- Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather (2007): “Historical overview of climate change”, in *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, Cambridge University Press.
- Skodvin, T. and A. Underdal (2000): “Exploring the dynamics of the science-politics interaction”, in S. Andresen, T. Skodvin, A. Underdal, and J. Wettestad, eds., *Science and Politics in International Environmental Regimes: Between Integrity and Involvement*, Manchester, Manchester University Press, 22-34.
- Steel, B., P. List, D. Lach, and B. Shindler (2004): “The role of scientists in the environmental policy process: A case study from the American West”, *Environmental Science & Policy* n° 7, 1-13.
- Swyngedouw, E. (1999): “Modernity and hybridity: nature, *regeneracionismo*, and the production of the Spanish waterscape, 1890-1930”, *Association of American Geographers*, vol. 89, n° 3, 443-465.
- Waterton, C. and Wynn, B. (2004): “Knowledge and political order in the European Environmental Agency”, in S. Jasanoff, ed., *States of Knowledge: The Co-Production of Science and Social Order*, London, Routledge, 87-108.