

## **Proposal for fitting governance systems to management of genetic biodiversity**

ANNICA SANDSTRÖM

LULEÅ UNIVERSITY OF TECHNOLOGY; STOCKHOLM RESILIENCE CENTRE, STOCKHOLM UNIVERSITY

Adaptive management implies a system in which policy and practice are constantly revised in a continuous circular process to accommodate new ecological knowledge. Even though scientific researchers warn that current fish stocking practices, including the introduction of alien populations, might have serious impacts on biodiversity and sustainability, stocking is perceived as a solution to many problems of modern fishery management. Why is this so and what could be done in order to bridge the gap between science and practice? Using Sweden and Finland as empirical points of departures, proposals for fitting governance systems to management of genetic biodiversity are discussed below.

The regulative framework, affecting stocking within the Baltic, shows immense variety in how the issue of genetic biodiversity is addressed, to what extent fish stocking is perceived as potentially contributing to genetic loss and, if so, what measures that needs to be applied. Fish stocking decisions are made within a complex policy subsystem that involves multiple actors and policy-making institutions, conflicting goals and competing notions of the problem. Thus, there is no clear policy regarding genetic concerns in fish stocking.

The current institutional framework opens for interpretations and leaves a lot of acting space for the regional-level bureaucrats that are making stocking decisions. A study of fish stocking decisions in Sweden showed that, even though all regions are embedded within the same institutional framework, they behave differently. While some regions have stopped all releases, others release large amounts of fish on a regular basis. These divergences can be explained by public officials' readings of the regulations, their own beliefs and opinions on the topic, their comprehensions regarding the validity of science, their risk perceptions, and finally, the available implementation resources, i.e. the network of mediators from which they receive expertise, advice and information. A comparative analysis of Finland and Sweden showed that the regional divergences, that were typical for the Swedish case, were not found in Finland. The bureaucrats in Finland share policy beliefs and make more equivalent decisions. This finding can be explained by substantial inter-regional cooperation and by the existence of one central mediator of knowledge in Finland. While the Swedish bureaucrats consult different institutions the Finnish bureaucrats make decisions based on advice from the same organisation. These studies imply that current governance system falls short in capacity to incorporate genetic biodiversity in policy and practice. The issue is embedded in uncertainty, both substantial and institutional. Moreover, the studies show that genetic diversity in general, and genetic concerns in fish stocking in particular, are not prioritized issues on the political and administrative agenda.

A traditional public management approach to this problem would be to increase adaptability by requesting more scientific research. The basic idea of this approach is that more and better science will decrease uncertainty and improve decision making. However, even though increased knowledge production is necessary for adaptive policy making, it is far from sufficient. Science plays a central role by influencing how a problem is understood, by raising concerns and by placing issues on the political agenda. Still, the processes of common problem formulation are aggravated by the fact that ecological knowledge more often than not is interpreted differently. The different belief coalitions, i.e. actors sharing the same view on a policy problem, will receive and comprehend the information differently. Management efforts aimed at enhancing adaptability must be directed toward handling – rather than reducing – uncertainty. To handle uncertainty and achieve change, learning across belief coalitions on various levels and in different policy sectors must occur. Researchers, policy makers and

stakeholders must exchange world views and formulate a joint image of the problem at hand. The bottom line is that a sole focus on generating new ecological knowledge will not succeed in narrowing the gap; instead, policy networks crossing belief coalitions are needed.

Formal policy makers can increase current governance system's capacity to incorporate genetic biodiversity in policy in two ways. They can 1) change formal regulations to enhance clarity about how to implement the far-reaching goals about genetic biodiversity in daily practice, and 2) influence the available implementation resources, for example by the formation of so-called boundary organizations, incorporating science and practice in common learning processes enhancing joint image building.

Regulations could be significantly more precise about how genetic concerns should be regarded in fish stocking. The terms 'alien species' and 'alien populations' could be uniformly defined and the room for interpretation narrowed. The restrictive attitude towards fish stocking that is evident in some strategies and policies could be incorporated into binding regulations. An institutional change of that kind would certainly narrow the gap between science and policy. Then again, detailed central regulations have the tendency to become inflexible, without provisions for regional contexts, which decreases the ability to make considerations and adjustments to accommodate regional contexts. Furthermore, a constant revision of regulations, as would be implied by adaptive management theory, is neither possible, nor desirable, since formal institutions ought to have a certain level of persistency over time.

As an alternative to a change in regulations, the implementation resources that bureaucrats, making the actual stocking decisions, have at their disposals can be affected. The interface between science and policy can be organised through the establishment of various kinds of boundary organisations, institutionalising stakeholder involvement and arranging meeting places between key groups of actors. The success of these structures is, however, far from given and will depend upon, for example, the structure of the collaboration networks and on the conflict level and distribution of power within the subsystem as a whole. Thus, cross-coalitional policy learning in regards to the genetic consequences of fish stocking is a prerequisite for adaptive policy making, although the establishment of these kinds of processes is coupled with many challenges. Both management options discussed above have positive as well as negative effects on the subsystem's adaptability as there is a trade off between the need for more detailed regulations on the one hand and the possibility to accommodate regional contexts in policy making on the other. It is a delicate matter for policy makers to decide when there is a need for an institutional change and when other policy measures are more suitable.

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