

CHAPTER 5

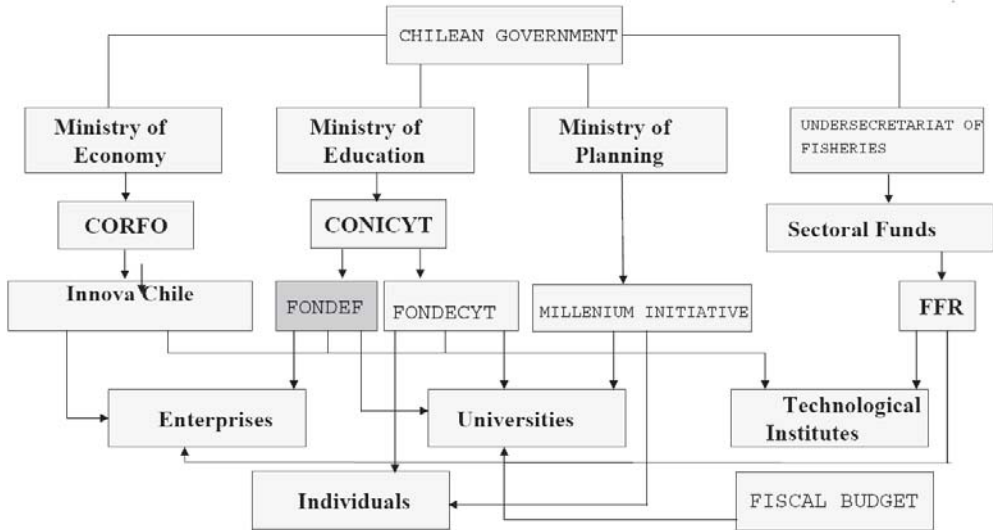
Research support for fisheries and aquaculture management

The efficient and effective regulation of fisheries and aquaculture requires scientific information based on the best available knowledge on fish populations, environmental conditions, oceanographic dynamics, social realities, etc. The role of science in managing and developing fisheries and aquaculture is significant and is a prerequisite for a profitable industry and a healthy environment. This chapter reviews the delivery of scientific inputs to the management process in Chile.

State supported and financed research

Basic research to be carried out annually to support management and control within fisheries and aquaculture is identified by the SSP, SERNAPESCA and by the various Fisheries Councils. As noted earlier in the paper, IFOP is the main research organization providing scientific support for the sector. Universities and technological institutions are also engaged independently or participate in public biddings to undertake research work ordered by the State. However, they act on a case by case basis only. Figure 5.1 provides a schematic of the structure of science research organizations and funds providing scientific support to the fisheries and aquaculture sector.

Figure 5.1. Public institutions and funds supporting innovation in fisheries and aquaculture



Source: Herrera, G., FONDEF, *Lineamientos y Visión del Quehacer de I+D en FONDEF*, Power-Point presentation, August 2006

IFOP has a highly regionalized structure with research stations situated the length of Chile. IFOP also owns and operates an oceanic research vessel (the *Abate Molina*), and rents others (as necessary) to carry out basic work on population dynamics, population surveys, etc. There are currently plans to buy extra vessels in order to be able to cope with innumerable tasks all along a very lengthy and wide EEZ (and beyond). IFOP's annual budget has grown in recent years from CLP 7 500 million in 2004 to CLP 8 500 million in 2008, or at about 3% a year in constant 2007 pesos.¹ Salaries represent between 45% and 50% of budgeted expenditures for those years.

There are three main financial sources through which specific projects are funded:

- *Banco Integrado de Proyectos* (Integrated Project Bank, or BIP): A State fund coordinated by the Ministry of Planning, financing diverse research initiatives originated in the different Ministries. In the case of fisheries and aquaculture, this is the main source financing basic studies regarding fish stock evaluation; fisheries management, etc. Projects financed by this fund can be hired directly, without public bids.

- *Fondo de Investigación Pesquera* (Fund for Fisheries Investigation, or FIP): A fund dependent on the Ministry of Economy, administered by a public-private council, chaired by the Undersecretary of Fisheries. This fund finances research dealing with the conservation of fishery resources; aquaculture; the environment; on fisheries, economic and social matters, etc. Projects are funded through a competitive public bidding process.
- *Fondo de Fomento de la Pesca Artesanal* (Fund for the Promotion of Artisanal Fisheries, or FFPA) is managed by SERNAPESCA and is the main financial source used to assist artisanal fishers in putting in place infrastructure, upgrading fishers' organizations, technically train fishers, restock coastal areas, and to improve marketing practices. Funds are granted through public biddings.

BIP's funds come directly from the annual budget of the government. IPB funds of about USD 4.5 million were spent during 2007, aimed at collecting and monitoring biological and fishing information, to evaluate stocks, and to determine the state of the most important fisheries.

In the case of the FIP, at least part of the resources available come from license payments corresponding to different fisheries. The parties involved can, at their choice and according to the applicable rules, pay part of their fees directly to the FIP. Figures available for the FIP indicate that this fund has financed research for a total of about USD 53 million between 1993 and 2006. Furthermore, annual budgets have increased during recent years, from about USD 5 million in 2004 to USD 8 million in 2006 and 2007.² The number of projects carried out since 1991 exceeds 300.

A number of other public funding sources are financing research in marine sciences, aquaculture and fisheries, among other sectors:

- FONDECYT, National Fund for Scientific and Technologic Development ('Fondo Nacional de Desarrollo Científico y Tecnológico'): managed by the National Council for Science and Technology, CONICYT, it aims at promoting basic research in several disciplines. It is extensively used by scientists working on fisheries and aquaculture related matters.
- FONDEF, Fund for the Promotion of Scientific and Technological Development ('Fondo de Fomento al Desarrollo Científico y Tecnológico'), also managed by CONICYT, aims at promoting and enhancing local R&D, particularly for projects focusing on innovation. This is one of the most attractive funds to scientists and technologist

working in fisheries and aquaculture, as it has devoted around USD 5 million annually to these areas since 1991.

- FONDAP, Fund for Advanced Research in Priority Areas (*Fondo de Investigación Avanzada en Áreas Prioritarias*), is managed by CONICYT and finances the establishment of Centers of Excellence that focus on the most advanced scientific research work on specific subjects. It is aimed at reinforcing the education of post graduate students, and to provide them with good employment opportunities.
- National Contest for Scientific and Technologic Research on the Antarctic (*Concurso Nacional de Proyectos de Investigación Científica y Tecnológica en la Antártica*), is managed by the Ministry of Finance and promotes research activities related with the Antarctic environment.
- CIMAR Program, (Research Cruises for Scientific Marine Research Program; ‘Programa CIMAR’, *Cruceros de Investigación Científica Marina*), funded by the Ministry of Finance, aims at interdisciplinary research on oceanography, meteorology, submarine morphology, etc.
- Innova Chile, probably the best funded and more active fund of late, is managed by CORFO, and started operations in 2004 with the aim of improving the competitiveness of the Chilean industry through innovation, entrepreneurship, etc. INNOVA has innumerable initiatives with different aims and targets with the funds mainly directed to the interface between innovation and enterprise. INNOVA absorbed the former FONTEC and FDI funds.
- NFRD, National Fund For Regional Development (*Fondo Nacional de Desarrollo Regional*), managed by the Subsecretariat of Regional Development, aims at financing initiatives leading to sustainable development and environmental improvements, together with initiatives on social and economic promotion of disadvantaged populations, so as to provide equal opportunities for development across the different Chilean Regions.

It is also worth noting that due to the Government’s concern about current investment levels in R&D in Chile, it has created the National Innovation Council for Competitiveness. Through this Council new resources will be applied in coming years to selected economic areas, one of which is aquaculture. The Council will manage the National Fund of Innovation for Competitiveness, which will supposedly handle a substantial budget coming from a new royalty applicable to the mining industry.

Aquaculture was among the eleven sectors of the Chilean economy that have been targeted for further State support on R&D initiatives, and it is expected that current funds will be strongly supplemented in the future, but to what extent is still unknown.

Research and development through private agents

Research to support the State in fisheries and aquaculture management are almost exclusively carried out and financed through the public sector. However, in recent years, industry from the VIII Region had become organized and financed their own research institution, INPESCA, aimed at studying those fisheries and related matters of particular interest to their members. The resulting research is used by fishers in the region to discuss management proposals suggested by the SSP.

More research from private industries on management issues is undertaken by INTESAL, the technical branch of SalmonChile, which was created in 1995. They have specialized on environmental issues associated with salmon farming, and have played a major role in developing and promulgating Codes of Practice for various farming or processing processes, including effluent management, garbage disposal, etc. As noted in Chapter 4, most of SalmonChile's members are already certified with regard to those standards and they have also adhered to Clean Production Practices as part of an agreement signed in 2002 with the Minister of Economy. INTESAL has also undertaken research on a number of other issues concerning farming methods and controls, the results of which have applied by their membership.

This very unique experience is associated with former agreements between SalmonChile and Foundation Chile ('Fundación Chile'), whereby that Foundation developed Quality Seals and Codes of Practices for salmon products meant for exports, becoming the first voluntary agreement of this nature implemented in Chilean aquaculture³, back in 1986. Through these agreements, SalmonChile had all exported salmon certified in terms of quality, guaranteeing foreign buyers the level of compliance associated with standards that were supported by Quality Seals. These very basic measures, supported by all their members, became a powerful marketing tool, at a time when Chile was only starting to export salmon, and its credibility as supplier was still unknown.

Foundation Chile is a technology transfer institution aimed at promoting new business developments in Chile, through the application of innovative technologies. In fact it was the institution which originally led the introduction of salmon farming in Chile. They have done the same work by

introducing abalone farming; Pacific oysters; sturgeon; channel catfish; halibut; turbot; hirame and other species. While a few of these species are farmed on commercial terms by now (salmon, trout, abalones, turbot, Pacific oyster), the remaining ones are still only being handled in pilot operations. The Foundation is also engaged in quality control of export products, and use to run the best ictiopathology laboratory in Southern Chile. They have various pilot scale farming operations along the length of Chile, where they experiment with new farming technologies, some of which are already used at commercial level. They also work on vaccines, genetics, etc.

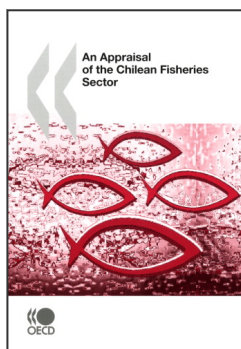
Two foundations complement the list of private actors on these matters, but this time, their support to research, like that of Foundation Chile, relates more to aquaculture and fisheries diversification and productivity improvements rather than to management issues: i) Foundation COPEC-Catholic University, and ii) Foundation Andes. Both have rather limited funding for research purposes, but support research initiatives, and supplement scholarships to facilitate post-graduate courses in fisheries, aquaculture and other subjects.

On top of these institutional frameworks that in one way or another helped financing research to achieve their goals, there are many other highly qualified scientific and technological institutions that carry out research and development tasks that back fisheries and aquaculture development in Chile. The areas of focus range from product development and control (INTA, University of Chile; SECTA, University of Santiago; Foundation Chile; CIENTEC, Austral University, etc.), to genetics, sanitary issues, etc.

Several of these institutions currently operate on premises originally built and equipped throughout the 1990s and early 2000s, with support from FONDEF. This State fund has been the main supporting means for these purposes across Chile. As soon as that phase was completed, and most Chilean Regions had been fairly well equipped in terms of basic infrastructure and laboratory facilities and equipment, FONDEF turned its financial support towards development projects that made good use of these installations. Also, it is worth noting that a fairly high proportion of projects financed by FONDEF during the last decade (not channeled to support diversification ideas) were destined to research on salmon farming sanitary issues (vaccine development, etc); environmental matters and projects related to feed improvements, digestibility, the search for alternative vegetable components, etc.

Notes

1. Values and calculations expressed in pesos of December 2007. However, the budget, expressed in current USD values has expanded from USD 11 million to USD 18 million, at a rate of approximately 13% per year between 2004 and 2008.
2. 2004-2006: FFR's anual Yearbooks. 2007: SSP, *Política Nacional Pesquera*, *op.cit.*
3. In fact, this voluntary agreement applied 'compulsorily' to whoever wanted to be a permanent member of SalmonChile in those years, but it was not imposed by the State. This initiative is unique in the recent history of local industrial activities.



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