

# Maintaining the “Public Good” Nature of Improved Fish Strains: Dissemination of knowledge and materials

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## Abstract

Many sources of information that discuss current problems of food security point to the importance of farmed fish as an ideal food source that can be grown by poor farmers, (Asian Development Bank 2004). Furthermore, the development of improved strains of fish suitable for low-input aquaculture such as Tilapia, has demonstrated the feasibility of an approach that combines “cutting edge science” with accessible technology, as a means for improving the nutrition and livelihoods of both the urban poor and poor farmers in developing countries (Mair et al. 2002). However, the use of improved strains of fish as a means of reducing hunger and improving livelihoods has proved to be difficult to sustain, especially as a public good, when external (development) funding sources devoted to this area are minimal<sup>1</sup>. In addition, the more complicated problem of delivery of an aquaculture system, not just improved fish strains and the technology, can present difficulties and may go explicitly unrecognized (from Sissel Rogne, as cited by Silje Rem 2002). Thus, the involvement of private partners has featured prominently in the strategy for transferring to the public technology related to improved Tilapia strains. Partnering with the private sector in delivery schemes to the poor should take into account both the public goods aspect and the requirement that the traits selected for breeding “improved” strains meet the actual needs of the resource poor farmer. Other dissemination approaches involving the public sector may require a large investment in capacity building. However, the use of public sector institutions as delivery agents encourages the maintaining of the “public good” nature of the products.

## What is a “Public Good” Nature?

The term “public good” is derived from a concept formulated by economists that allows us to differentiate between those goods that are “non-rivalrous” and “available for use by all simultaneously”, from those that are not<sup>2</sup>. For organizations that are primarily concerned with transferring know-how, technical information and materials to the poor farmer, a “working” definition of public goods, though technically flawed, may prove to be a more practical alternative definition. For example, such a “working definition” would include as public goods the products/knowledge with the attributes of being:

- Useful (beneficial)
- Accessible to all
- Distributed/disseminated
- Amenable to simultaneous use with no exclusivity

Such a definition allows those of us that work “close to the ground” to have a more definite understanding of what are called public goods. It should be noted that such a working definition does not refer to ownership, intellectual property rights (IPRs), or other legal/regulatory issues. Nor is there a concern about benefit-sharing *per se*.

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<sup>1</sup> As an example of the relative paucity of support, a report issued by the U.S. Department of Commerce, the (U.S.) National Oceanic and Atmospheric Administration, and the (U.S.) National Marine Fisheries Service (The Rationale for a New Initiative in Marine Aquaculture 2002), indicated that the support for aquaculture from USAID was only US\$3 million, out of the total (2001) budget of roughly US\$7,587,278,000 (Source of 2001 budget figures : <http://www2.usaid.gov/pubs/cbj2002/request.html>)

<sup>2</sup> For a current discussion of the formal definition of the term “public good”, the information at the Wikipedia site: [http://en.wikipedia.org/wiki/public\\_good](http://en.wikipedia.org/wiki/public_good), may be of interest to readers. For a more classical formal definition, see [http://www.dur.ac.uk/t.i.renstrom/teaching/PUBECON/Lect\\_12.pdf](http://www.dur.ac.uk/t.i.renstrom/teaching/PUBECON/Lect_12.pdf) or [http://www.who.int/trade/distance\\_learning/gpgh/gpgh1/en/index1.html](http://www.who.int/trade/distance_learning/gpgh/gpgh1/en/index1.html). Another interesting discussion can be found in the reference, “A Theory of the Theory of Public Goods” by Randall G. Holcombe, which can be viewed at the URL: [http://www.mises.org/journals/rae/pdf/rae10\\_1\\_1.pdf](http://www.mises.org/journals/rae/pdf/rae10_1_1.pdf).

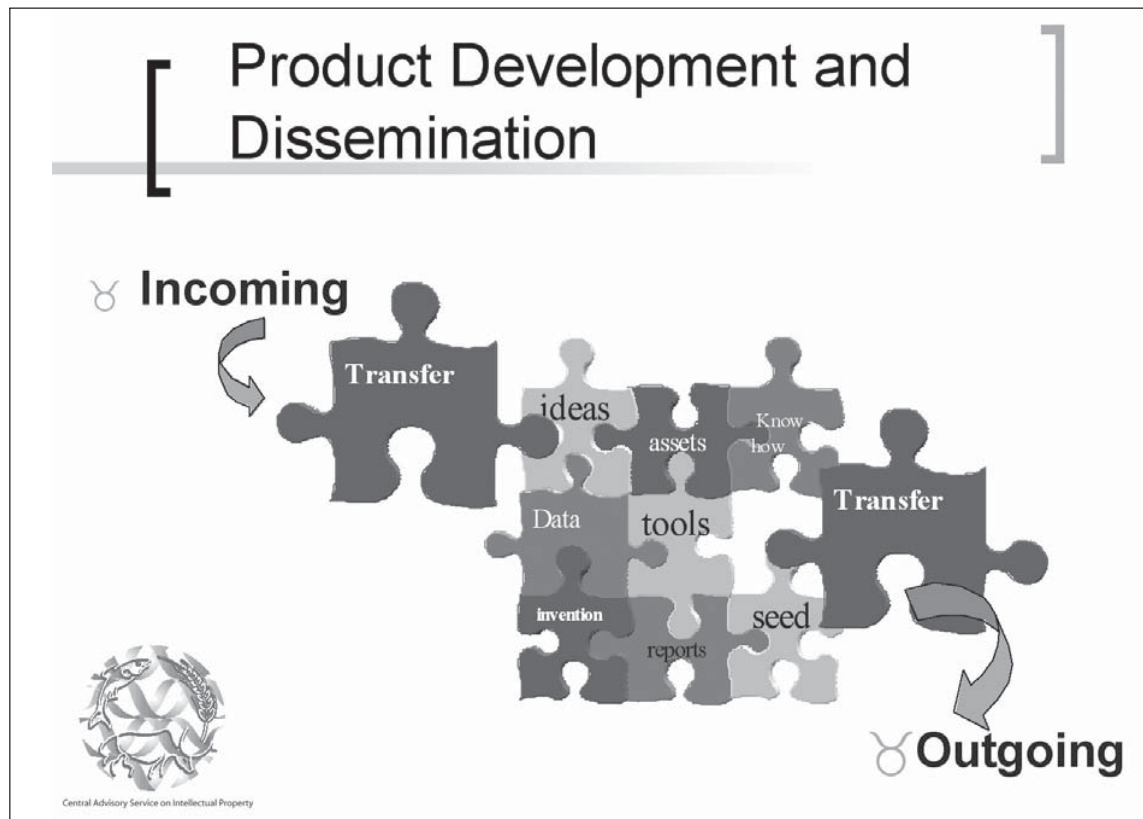
## Why should we be concerned about maintaining the “public good” nature of improved fish strains?

*Some possible reasons include:*

- The most straightforward way of ensuring access and distribution to the poor farmer
- Traditional/historical way to catalyze small entrepreneurs in developing countries
- Burden of limiting potential legal problems of the originator

Distribution of products that are public goods is an effective and equitable means by which those of us that work in the public arena can attempt to live up to our mandate for addressing poverty and

malnutrition. Public funding of research that produces products that address the needs of poor farmers is the fundamental mode for improvement of livelihoods through agriculture. In addition, public investment in the plant breeding sector with the subsequent uptake of these varieties by entrepreneurs is one approach to a “sustainable” way to address poverty and malnutrition in developing countries; this has been highlighted as the classical way in which seed companies are established, thus taking on the role of supplying improved seed to the farmer, (D. Duvick, as cited in Fernandez-Cornejo 2004)<sup>3</sup>. The emphasis for the last bullet point is brought home by the fact that product development usually includes the improvements that one institution has made, combined with inputs made by or belonging to others, as illustrated in Figure 1.



**Figure 1. Product development and dissemination.**

<sup>3</sup> For a discussion of this point from an “entrepreneurial” view, see “International Agricultural Development: Role of Private Industry,” by Bruce Maunder, at the URL: <http://cropandsoil.oregonstate.edu/News/Publicat/Kronstad/38.html>. For a view from the opposite side, see, “Stolen Seeds: The Privatization of Canada’s Agricultural Biodiversity”, by Devlin Kuyek, at the URL: [http://www.interpares.ca/en/publications/pdf/stolen\\_seeds.pdf](http://www.interpares.ca/en/publications/pdf/stolen_seeds.pdf).

In the product development pathway, the rights and responsibilities that are associated with all the inputs need to be well defined and noted to ensure that none of the inputs used imposes restrictions that preclude the use or distribution of the end product to the poor. Even though there is no explicit mention of IPRs or legal and regulatory concerns when we are describing or defining a public good, it is easily seen that there is a need to make sure that no ownership/rights/regulatory issues interfere with the distribution of knowledge and/or products. By using a particular input, it is possible that we would undo the “public good nature of our product”. For example, if a proprietary marker for a particular gene allele was obtained from the owner under a material transfer agreement (MTA) that stated the marker was only to be used for “research purposes and not to select for fish that would be distributed for consumption or breeding”, great care would need to be taken to make sure that the terms of this MTA were not violated. It should be noted that in this example the marker, as a separate entity, would not end up in the selected fish. However, the use of the marker would still be prohibited if the resultant fish were going to be distributed outside of the research setting. If we have a product that cannot be distributed, then we no longer have a product that, in a practical sense, still has a public good character.

Presented in Table 1 are proposed categories of restrictions that can affect the “public good” nature of a product; this emphasizes the legal/IPRs constraints that should be identified with the use of inputs or resources in the production of any public good. While perhaps not all would share the view that the originator of the public good product should shoulder the responsibility of clearing legal and regulatory hurdles for its distribution, this author believes this is a key requirement for an equitable mode of access to public goods.

Access to improved fish strains is the most direct way to assist poor farmers attempting to utilize aquaculture as a means of improving their nutrition and livelihoods. Farmers may not have the money, resources, knowledge, energy, or necessary negotiation skills to obtain fish from a commercial source or to breed improved fish from seed stocks supplied to them. It is incumbent on those in institutions financed by public monies to provide knowledge and materials to stakeholders and clients as public goods, i.e. free of restrictions that prevent their use and distribution by the poor. In the Consultative Group on International Agricultural Research (CGIAR), it is our core business to provide public goods for poor farmers in developing countries<sup>4</sup>.

**Table 1. Potential constraints to distribution of products.**

Potential constraints to distribution of products:	
<ul style="list-style-type: none"> <li>■ Legal/IPR</li> </ul>	<ul style="list-style-type: none"> <li>■ What are the inputs to this product?</li> <li>■ Are there agreements, contracts, etc., associated with these inputs?</li> <li>■ Are there any IPRs over these inputs?</li> <li>■ Any provisions in funding agreements that might inhibit distribution of products?</li> <li>■ Compliance with national, regional, international commitments/treaties in users' areas?</li> </ul>
<ul style="list-style-type: none"> <li>■ Biosafety</li> <li>■ Food safety</li> <li>■ Other regulatory constraints</li> </ul>	

<sup>4</sup> The mission of the CGIAR is: “To achieve sustainable food security and reduce poverty in developing countries through scientific research and research-related activities in the fields of agriculture, forestry, fisheries, policy, and environment.” For more information about the CGIAR, please see the webpage at the URL: <http://www.cgiar.org>.

## How can we maintain the “public goods” nature of improved fish strains?

A process for accomplishing this can be carried out by a practice called “**Asset Identification**”. For the products already developed, this can be initiated by adequately describing them. Such a description might include the selection criteria and/or other phenotypic/genotypic information associated with an improved strain. It is important to document what has been done by staff of the institution and what ideas staff might have for carrying out further work on the materials that have been developed. All relevant documents such as funding contracts, material transfer contracts/agreements, agreements signed by visiting scientists working on projects associated with each project, etc. need to be organized and examined for language that might restrict potential distribution.

For products at a planning stage, a recommendation should be drafted concerning a technology transfer plan, or a product development and distribution plan. Such a plan would seek to answer questions such as:

- What are the needs of potential users?
- What is the plan for developing the strain, growing out seed stock, and disseminating fingerlings, from the start of the project?
- What capacity building/resource procurement activities need to be initiated to prepare farmers for utilizing the improved strains?
- What are the inputs and investment burdens on users (resource poor farmers)?
- Will partners be needed for product development and dissemination?
- How will monitoring, evaluation, and impact analysis be incorporated into the research plan?

Such a plan would lead to the development of a dissemination/business plan, and allow for the identification of skills, knowledge, and experience needed for each step in the plan. It would also allow for strategic decisions regarding capacity building or the use of existing expertise and capacity.

It is of course obvious that funding will need to be obtained under contracts that do not restrict our ability to distribute materials as public goods. Therefore, it is most likely that money will need to be public funding or some type of governmental intervention, or from philanthropic institutions. If the money is from private entities, these firms should be provided with a motivation such as tax incentives, etc. given to business entities that provide funding to public agencies/organizations/institutions, (National Academy Press 1999). (In addition, with less money allocated to fund research than in the past, others have proposed various schemes such as the awarding

of monetary “prizes” to those that produce the most useful public goods, (Love and Hubbard 2005).)

What about partnerships? Collaborative arrangements between institutions with complementary skills and/or assets have long been a means of producing public goods. In the past, particularly in agriculture research and product development aimed at producing public goods for the poor farmer in developing countries, these partnerships were between public partners (For example, see Mensah and Bie 1999). Public-private-partnerships (PPPs) are being promoted by a variety of organizations as a means of providing resources, know-how, and technology to public sector organizations (Spielman and von Grebmer 2004). Regardless of the type of partnership that is established, it will be necessary to go through a process of coming to an agreement regarding skills and assets to be contributed by each partner, roles and responsibilities that each partner will have, and means of resolving conflicts in the partnership ( For example, see Henson-Apollonio 2005). There will need to be a “coming to an agreement” over roles, responsibilities, and expectations in dealing with conflicts. Even the selection of traits, e.g. high growth rate, disease resistance, maturation rate, tolerance to high salinity water, may need to have a formal agreement among all partners. In the end, sometimes it may not be possible to reach an agreement, as indicated by the case of the company Icy Waters, a charr aquaculture company in northwestern Canada and the Nunavut Tribe (NWMB Meeting Minutes 1997). However, all would agree that it is important to establish this beforehand, if possible.

It is very important to develop the legal structure to support the development and dissemination plan, in language that is clear to staff from each institution. In addition, it is likely that different types of partnerships arrangements and agreements for different types of partners will be needed in order to ensure the “public good” nature of the improved fish strains, knowledge and/or know-how. Understandings among partners should place emphasis on “well-defined” roles in PPPs. In any research project, especially in putting together PPPs, time should be spent on defining the purpose of the research, i. e. what the expected “public good” products will be. This allows for the understanding of several important things such as:

- What partners will be needed, with what skills or resources and what steps to be taken to engage in a positive and “public good” framework?
- How to choose partners wisely?
- How to build in M&E and impact assessment methods, and to choose the partners to do this?
- What resources (financial and human) will need to be invested in transactions?
- What might be the negative aspects of the proposed research (e.g. introduction of alien species) and how will these negative aspects be overcome, or can they be overcome with the

technology that is available in the context in which the products will be utilized?

- What problems are likely to arise?
- What is a communications strategy?

It might even be necessary to develop and adopt an Intellectual Property Policy Statement to ensure that there are no misunderstandings regarding the “public good” nature of the proposed research products. If at all possible, agreements should be reached, wherein the text can be made available, at least to researchers, if not always to the public at large. (An example from another biological field is the US Public Health Service/DuPont Pharmaceutical MOU for access to “Cre-Lox” mice. See, URL: <http://www.ott.nih.gov/pdfs/cre-lox.pdf>)

The need to have local partners involved in producing public goods cannot be overstated, especially in aquaculture projects. Governmental agencies/ministries should be identified, including those that deal with quality control of food fish, water resources, and biodiversity/environmental regulators. In addition, with aquaculture projects, some public goods may take the form of advocacy/building capacity in advocacy. It is quite likely that, in order to gain acceptance for improved fish strains, the projects will involve some degree of advocacy that may include public consultations/discussions regarding the following aspects:

- Whether governments are only concerned with “technical problems” solvable by experts
- Whether regulation is the “state’s responsibility”
- Whether “industry” should self-regulate in their own interests when state capacity is insufficient
- Whether the contribution for improving the sustainability of the industry is from small scale farmers; hatcheries and traders; local communities where farms and factories are sited; and consumers and broader civil society including the international research community
- Whether the poor can have access to wetlands

In line with the above, consider this excerpt from a review article on the GIFT project:

“As poor farm practices or other environmental problems can inhibit the effective use of the improved GIFT strains, the Foundation has begun providing technical support to Philippine farmers of the GIFT strain.”

Greer and Harvey (2004)

Another area that should be considered is the publications that are associated with research and experience in aquaculture. Authors should be encouraged to publish their results, stories, and recommendations in “Open Access” journals and/or to make copies of their manuscripts available on publicly accessible websites. (See: <http://www.doaj.org/articles/about#definitions>, <http://www.eprints.org/documentation/handbook/overview.php>, and <http://creativecommons.org/>. for more information.) Authors should also ensure that their publications serve as defensive publications, i. e. serving as prior art for the purposes of preventing the patenting of their ideas and/or innovations. (For guidance, see Adams and Henson-Apollonio 2002.)

In conclusion, thoughtful planning and attention to detail in project management are necessary for assuring the “public good” nature of improved fish strains, knowledge and know-how associated with improved strains, including even those that are produced by public institutions with public funds and resources.

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