62nd Annual Meeting
of the European Federation of Animal Science
Stavanger - Norway, 29th August to 2nd September 2011

Stimulating innovation in aquaculture:
ACCESS TO AND PROTECTION OF AQUACULTURE GENETIC RESOURCES

Ingrid Olesen, Kristin Rosendal,
Anitha Ramanna Patak &
Morten Walløe Tvedt

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

Relevance and background

- **Goals Norwegian Aquaculture**: safeguard coastal settlements & value creation, sustainability and innovation
- **Globally** <10% of aquaculture production based on genetically improved stocks
- High reproduction capacity of fish - ‘piracy copying’

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

Relevance and background

- **Goals Norwegian Aquaculture**: safeguard coastal settlements & value creation, sustainability and innovation
- **Globally** <10% of aquaculture production based on genetically improved stocks
- High reproduction capacity of fish - ‘piracy copying’
- Fish breeders need **protection** of genetic material to assure fair return from investments in genetic improvement

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

Research question and objective

- Fish farmers and breeders need a**ccess** to genetic resources for food production, and further innovation
- How to balance protection & access - and meet goals for aquaculture?
- Identify and discuss possible solutions for regulating access and legal protection in aquaculture
- Investigate actor perceptions of needs and interests in the aquaculture sector

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Factors affecting perceptions of access and legal protection

- Evolving domestic and international regulations
- Changing structures in the aquaculture sector
- Biological and technological developments

⟹ Need for multidisciplinary approach

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

Case studies

- **Atlantic salmon:** Use of Norwegian salmon stocks
- **Atlantic cod:** Norwegian cod stocks in Norway
- **Tilapia:** Use of GIFT tilapia in South-East Asia
- **Carp:** Domestic use of rohu carp stocks in India
- **Shrimp:** Domestic use of Indian and exotic shrimp in India

Nofima

Tension between international objectives

- Convention on Biodiversity (CBD):
  - Access to and equitable sharing of benefits from utilisation of genetic resources, linked to conservation and sustainable use of biodiversity
- WTO/TRIPS, WIPO (and ACTA):
  - Harmonise & strengthen patent protection to stimulate innovation
- ABS and patents cause tension in seeds and pharmaceutical sector: Different in aquaculture?

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

Norwegian norms and legislation

- Norms & current practice: Material from public breeding programmes is shared with other users
- Legislation: Tension between access and legal protection is visible, but not resolved
  - Nature Diversity Act (2009) and Wild Marine Resources Act (2008): Genetic material from wild defined as commons resource. Implications for genetic material in public breeding programmes?
  - Current legislation does not solve questions of rights to public breeding programs or rights to breeding material when sold to commercial farms

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Photo: V. Vassvik

Salmon and cod farming in Norway

Photo: V. Vassvik

- Salmon breeding:
  - from public to cooperative to private ownership: salmon breeding programme sold to MNC German EW Group
- Cod breeding:
  - one public & one private breeding programme
  - uncertainty regarding commercialization

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

The case of GIFT tilapia (Ponzoni et al, 2010)

- Genetic Improvement of Farmed Tilapia (GIFT)
  - funded by UNDP & FAO & donors for food security
  - improved fish & low-input technology freely disseminated to poor fish farmers in Asia (by WorldFish Centre)
  - ABS issues with African providers of tilapia
- MNC GenoMar buys most of GIFT:
  - high costs & no accompanying training
  - Integrated production
- WorldFish Centre:
  - small outlet, fry and technology less accessible to poor

GenoMar
SAFE SUSTAINABLE SEA HARVEST

WorldFish
CENTER

Findings India (Ramanna, 2011)

- Public-private partnerships - differing priorities
- Limited national breeding and more dependence on exotic genetic resources
- Public sector tied up with regulation & monitoring - less resources & capacity for RD.
  Further demands for rights - how reach objective of freely sharing material?
- Short term profits may distract Indian industry from long term goals (lacking attention to access)

Nofima

Case findings

Paradox of value in breeding programmes:

- All cases, short term: Expensive to produce fast growing, disease free fish; cheap to copy results (short term)
- GIFT lesson: Low willingness to pay, high interest in access
- Long term: Expensive to maintain high quality product – how to secure this?

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Structural and normative change

- Initial strong public funding of breeding programs
  - Normative ideal of affordable access to improved breeding material
- Persistent needs, changing norms?
  - Increased demand for profitability and efficiency

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Results, interviews: Perceived needs

- Currently no hurry to change, due to biological protection:
  - Confidence in own superior genetic material, do not need strong legal protection of the material
- This is changing as future developments may make legal protection necessary:
  - Plant breeders' rights for fish? Or patents?
- Patent process complex and currently of low relevance, except for large scale actors:
  - Actors caution against 'Monsanto-like' monopolies (like in crop sector)

Olesen et al., 2007

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

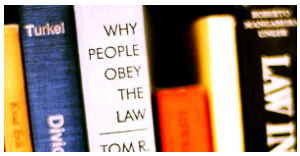
Procedures to secure owners rights ?

Biological protection

- continuously improvement and documentation
- crossbreeding
- sterile grow-out fish

Legal protection

- Branding
- Material transfer agreement (MTA)
- Patent



Mandatory certificate of origin

- Verified by DNA-markers

Rosendal et al., 2006

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

Summary of results

- Demand for profitability is driving force for patents – genetic engineering
- Real value mainly in selection and continuous upgrading – patents not useful for this
- Stimulation of aquaculture breeding needed
- Public ownership/support for selective breeding needed to balance objectives?
- Cooperative ownership worth considering

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima

Acknowledgements

•Funding from FUGE and IndoNorway programs of the Research Council of Norway

The Research Council of Norway

•Interviewees

•Hans B. Bentsen, Nofima

Thank you for your attention!

FRIDTJOF NANSENS INSTITUTT
FRIDTJOF NANSEN INSTITUTE

Nofima