The role of distribution chains in promoting the sustainable production and consumption of seafood products

SDG 14: Life below water

Ocean Forum, UNCTAD, Geneva, 22nd of March 2017, Andreas Stein
Structure:

- Intro: Sustainability is ......
- Seafood: Definition, Figures & Facts
- Stakeholders Seafood: NGOs/Businesses/Science
- Aquaculture feed
- Sustainability Development
- Conclusion
Intro: Sustainability is an old issue

Only after the last tree has been cut down /

Only after the last river has been poisoned /

Only after the last fish has been caught /

Then will you find that money cannot be eaten.

Augury Cree Indians
Intro: Sustainability is a present issue

MSC ASC
GLOBAL G.A.P.
IFFO-RS
ESF Eel Stewardship Fund
Supporting eels, by creating a trademark

More about it in Chapter: „Stakeholders Seafood/NGOs/Businesses/Science“
**Intro: Sustainability is a future issue**

Graph 3: Forecast of the world population between 1950 and 2050 (sorted by region); in billion and percentage by region

<table>
<thead>
<tr>
<th>Region</th>
<th>1950</th>
<th>1970</th>
<th>1990</th>
<th>2010</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afrika</td>
<td>0.9%</td>
<td>1.2%</td>
<td>3.4%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Asien</td>
<td>56%</td>
<td>58%</td>
<td>60%</td>
<td>60%</td>
<td>59%</td>
<td>55%</td>
</tr>
<tr>
<td>Europa</td>
<td>9.4%</td>
<td>10%</td>
<td>12%</td>
<td>15%</td>
<td>19%</td>
<td>24%</td>
</tr>
<tr>
<td>Nordamerika</td>
<td>7%</td>
<td>11%</td>
<td>14%</td>
<td>15%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Europe: 21% of 2.5 bn. = 0.525 bn. people
Asia: 56% of 2.5 bn. = 1.4 bn. people
Africa: 24% of 9 bn. = 2.16 bn. people

Small-scale fisheries, fishing and farming, abt. 37 Mio people, 90% are in Asia. Additional 100 Mio. people are employed in associated activities.

**Note:**
- Asia: 55% of 9 bn. = 4.95 bn. people
- Europe: 8% of 9 bn. = 0.72 pn. people
Intro: Sustainability is a future issue

GROWING NEED FOR PROTEIN
The global need for food is growing, and the need for protein is expected to increase by 70 per cent worldwide by 2050. We believe that farmed seafood offers one crucial solution to meeting this demand. Fish is the most resource-efficient animal protein available to humans, aside from insects.

source: Ewos
Seafood Definition:

Capture Fisheries and Aquaculture

- abt. 1kg Growth = 10kgs “Feed intake“
  - Sea and Land

- abt. 1kg Growth (BM) = 1kg Feed intake
  - Land and Sea

Source: Feap Introduction „Fifo- Fish in fish out“

FAO: 578 species Aquaculture (Fish, Mussels, Crustaceans, Algae, and so on)

FCR in comparison:
- Cattle ca. 1:5
- Pig ca. 1:3
- Broiler ca. 1:1,6
World market Seafood: Who and what?
World market Aquaculture: Europe

Figure 7.1: Main aquaculture producers (\(^1\)), EU-28 and Norway, 1995 and 2012 (1,000 tonnes live weight, %)

- **1995**
  - EU-28 total = 1,188
  - Other EU-28 24%
  - Netherlands 7%
  - United Kingdom 8%
  - Italy 18%
  - France 24%
  - Spain 19%
  - Norway = 278

- **2012**
  - EU-28 total = 1,251
  - Other EU-28 24%
  - Greece 9%
  - United Kingdom 17%
  - Italy 13%
  - France 16%
  - Spain 21%
  - Norway = 1,321

\(^1\) Excluding production from hatcheries and nurseries, fish eggs for human consumption, ornamental and aquarium species. 

Source: Eurostat (online data codes: fish_aq_q and fish_aq_2a)
Aquakultur in Deutschland - wer macht was?

<table>
<thead>
<tr>
<th>Betriebsform</th>
<th>Anzahl Betriebe</th>
<th>Erzeugte Menge (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teiche (Karpfen)</td>
<td>2100</td>
<td>5600</td>
</tr>
<tr>
<td>Becken, Filetkanäle, Forellenteiche</td>
<td>1400</td>
<td>10500</td>
</tr>
<tr>
<td>Kreislaufanlagen</td>
<td>65</td>
<td>2800</td>
</tr>
<tr>
<td>Netzehege</td>
<td>20</td>
<td>85</td>
</tr>
<tr>
<td>Meerwasser (MUSCHELN)</td>
<td>11</td>
<td>8000</td>
</tr>
</tbody>
</table>

Anzahl Betriebe und erzeugte Menge Fisch in Süßwasser nach Aquakulturstatistik in 2015 in Deutschland (www.destatis.de)

- 3300 Aquakulturbetriebe 2015
- 18,500 t Fische
- 8,000 t Muscheln

2015 wurden in Deutschland 1,15 Mio. t Fisch und Seafood verzehrt (FIZ, 2016)

87% wird importiert!
# Aquaculture/Fish: Germany

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seafood/Fish inland capture</td>
<td>42,400tons</td>
<td>100%</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>21,000tons</td>
<td>49.5%</td>
</tr>
<tr>
<td>Share Freshwater fishing*</td>
<td>21,400tons*</td>
<td>50.5%*</td>
</tr>
</tbody>
</table>

*Breakdown Freshwater fishing in total: 21,400tons 100%
Fisheries (around 900 Fisherman, mainly SSF): 3,000tons 14%
Sportfishing (around 1.8Mio licenses): 18,400tons 86%

Source: Jahresbericht zur deutschen Binnenfischerei und Binnenaquakultur 2015
Aquaculture/Fish: Codfish current situation

March 2017: Capture is stopped in the Baltic Sea for min. 8 weeks

1. Fisheries suffer losses
2. Compensation is hard to survive
3. Change is expected from Fisheries to Small Scale Fisheries
**Stakeholders Seafood: NGOs/Businesses/Science**

Following stakeholders are just examples for the Seafood-Industry:

- MSC, ASC, GLOBAL G.A.P., PSPA
- EW Nutrition GmbH, Leiber GmbH, Miavit, Biomin, Euroduna Group
- Aller Aqua/Biomar/Ewos/Skretting/Coppens
- Deutsche See
- Christian Albrecht University (CAU)/GMA
Stakeholders Seafood NGO: MSC

Top ten MSC certified fishing areas by percentage of total catch:

- Western Central Pacific: 5%
- Antarctic Pacific: 34%
- Northwest Atlantic: 32%
- Antarctic: 47%
- Southwest Atlantic: 40%
- Antarctic Indian Ocean: 45%

* MSC certified catch within United Nations (UN) Food and Agriculture Organization (FAO) Major Fishing Areas compared with land reported catch (FAO 2014)*
Stakeholders Seafood NGO: ASC

ASC 5 years after first farm certified:
More than 400 farms certified around the globe

ASC at farm level

- 428 certified farms in 37 countries (all continents)
- 1,097,201 metric tones — 3-4% of global volume (of these species)
- Salmon and shrimp growing the fastest

ASC in the supply chain

- Same Chain of Custody Standard as MSC
- 1,126 certified partners in supply chain

ASC labeled products

- 7,348 approved products in 58 countries globally
- Central & Northern Europe leading
- Other markets emerging (France, Asia)

Data: ASC, February 2017
Stakeholders Seafood NGO: GLOBAL G.A.P.
Stakeholders Seafood NGO: Naturland

- Naturland AQUACULTURE
  - Strict, detailed standards
  - Transparent procedures
  - Effective systems
  - Clear added value
  - Credible communication

- Naturland WILDFISH
  - Capture Fishery Certification
  - Focus on artisanal fisheries, widely neglected by other fishery certification schemes
  - Strong social component in the standards (*a global novelty!*)
  - Unique combination of 3rd-party certified, sustainable fishery, social standards, and organic processing

10.03.17|Sheet3| www.naturland.de
Stakeholders Seafood NGO: PSPA

Alaska Salmon
Wild, Natural, Sustainable

Glenn Reed, President
Pacific Seafood Processors Association

SUSTAINABILITY MANDATE

Salmon sustainability is inherent in Alaska’s governance system.

State of Alaska Constitutional mandate (1959):

“Fish...shall be utilized, developed, and maintained on the sustained yield principle...”
A good example of SUSTAINABILITY
Stakeholders Seafood: Feed „EW Nutrition GmbH“

Conclusion

**Activo® Aqua**

- leads to improved performance parameters
- reduces the use of antibiotic growth promoters
- enhances the profitability of our customers
Chains of β-1,3-linked D-glucose monomers; linear, or branched with β-1,6-linked side chains

Isolated from yeast cell walls, cereals, algae, bacteria, fungi

Highly purified β-glucans

Prophylactically boosting immune competence

Immune modulating effects proven in aquatic organisms, livestock, companion animals and humans
Overview about feedstuffs and additives:

**Pro-biotics:**
Stimulating lactic production, consuming oxygen
Product ranges: different lactic acids forming bacteria, Special bacterial strains (B. subtilis, P. E. facium) and live yeast
Commercial products: Bactocell, Calsporin, Bioplus 2B, Levucell

**Enzymes:**
Enhancing digestibility of phosphorous and NSP
Product ranges: Fytase, NSP enzymes
Commercial products: Ronozyme, Phyzyme, Xylanase

**Mycotoxin binders:**
Binding and disabling mycotoxins
Product ranges: Binders (bentonite, zeolite, and diatomaceous earth), Yeast cell walls
Commercial products: MiaBond (Trophy), Mycofix, Tox-Aid

**Omega 3:**
Delivering omega 3 fatty acids
Product ranges: algae, fungae and oils (salmon oil, rapeseed oil with EA and DHA)
Commercial products: DHAgold, Salmon oil (farmed)
**Stakeholders Seafood: Feed „Biomin“**

**What are mycotoxins?**
- *Fusarium sp.*, secondary metabolites produced by fungi, produced under favourable environmental conditions...
- *Aspergillus sp.*
- *Penicillium sp.*
- *Alternaria sp.*
- *Claviceps sp.*, etc.

**BIOMIN Mycotoxin Survey 2016**
- 16511 samples, 63630 analyses, 81 countries
- **Afla**, **ZEN**, **DON**, **T-2**, **FUM**, **OTA**
- 6 out of 10 samples had at least one mycotoxin above the threshold levels

Covers 8271 samples, 75 countries. 1st survey in 2004.
Stakeholders Seafood: Feed „Biomin“

Effects of mycotoxins depend on
- toxin-, animal- and environmental-related factors
- Farm management (hygiene, humidity, temperature, etc)
- Age, sex and species
- Duration of exposure
- Nature and level of mycotoxin concentration
- Nutritional and health status
- Other toxic entities

Effects of Mycotoxins

Trichothecenes (Deoxynivalenol, T-2 Toxin)
- Reduced body weight
- Inhomogeneous growth
- Physiological disorders
- Lower hematocrit count

All Mycotoxins
- Poor growth
- Immunosuppression
- Increased mortality

Trichothecenes (Deoxynivalenol, T-3 Toxin)
- Reduced feed consumption
- Lower hematocrit
- Lower blood hemoglobin
- Poor feed conversion ratio

All mycotoxins
- Reduced growth
- Higher mortality
- Lower weight gain

Aflatoxin
- Low apparent digestibility
- Negative effect on digestive enzymes
- Physiological disorders and histological changes
- Hepato-pancreatic damage
- Lower hematocrit
- Reduced growth
- Increased mortality

Zearalenone
- White Shrimp - decreased growth
- Black Tiger Shrimp - Growth was not affected
- Deposit in meat

Ochratoxin A
- Pigs
- Severe histopathological lesions of skin
- Liver necrosis
- Pale, swollen kidneys

Fumonisins B1
- Lower hematocrits
- Histopathological lesions
- Lesions in the esophagus and endocrine pancreas
- Lesions in intestinal tissue
Stakeholders Seafood: Feed „Euroduna Group“

Ingredients for fish feed

Everything from fish
- Fishmeal
- Fish oil

Everything from pig
- Hemeoglobin powder
- Plasma powder
- Blood meal (spray dried)
- Blood meal (ring drier or disc drier)
- Greaves
- Meat & bone meal

Everything from poultry
- Poultry blood meal
- Poultry meal
- Poultry meat bone meal

Vegetable origin
- All common plant proteins (Soy, Wheat, Corn etc.)

Others
- Minerals (mineral mix)
- Vitamins (vitamin mix)

Example:
Nutritional Requirements of Tilapia Fingerlings

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Content %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>17.5</td>
</tr>
<tr>
<td>Crude protein</td>
<td>69</td>
</tr>
<tr>
<td>Crude fat</td>
<td>9.3</td>
</tr>
<tr>
<td>Crude ash</td>
<td>6.8</td>
</tr>
<tr>
<td>Water</td>
<td>14</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>13.0</td>
</tr>
<tr>
<td>Salt</td>
<td>0.0125</td>
</tr>
<tr>
<td>Sulphur containing</td>
<td>0.015</td>
</tr>
<tr>
<td>Nitrogen-free basis</td>
<td>11.06</td>
</tr>
<tr>
<td>Total crude meal</td>
<td>11.06</td>
</tr>
</tbody>
</table>

Euroduna's important role:

Providing the Aquaculture industry and Petfood industry with by-products from Fish processing industry
Overview of New Products from Euroduna

- Duna YPC 55C & Duna YPC 55F
- Lecitihine
- Inositol
- Organic bound trace minerals
- Chia-seeds
- Insect protein and oil
Stakeholders Seafood: Fishfeedproducers

- Skretting
- Ewos
- Biomar
- Aller Aqua
- Coppens
- and others in Asia, ROW
Stakeholders Seafood: Fishfeedproducers

Abstract ALLER AQUA Sustainability Statements

Sustainability is an integrated part of Aller Aqua. We know that modern fish farming has the highest requirements when it comes to reducing environmental impact. We reduce environmental impact by choosing only raw materials with sustainable origin. Further, feeds are formulated for highest efficiency and nutrient digestibility resulting in low nutrient discharge to the water.

- All raw materials are purchased from certified suppliers following international quality standards (e.g. ISO, HACCP or GMP+).
- All raw materials are non-GMO.
- Local raw materials are prioritized.
- All soy products are certified regarding to responsible farming (e.g. RTRS, ProTerra or ISCC).
- Wild captured fish used to produce fishmeal and fish oil come from healthy fish stocks and do not originate from endangered species. Certifications ensuring sustainability are e.g. MSC/ISEAL or IFFO-RS.
- By-products (trimmings) from fish processing plants, which are acknowledged as a sustainable source of marine raw materials, are used as a regular marine raw material.
- Undesirable substances are under strict surveillance.
Stakeholders Seafood: „Deutsche See“

Sustainable Fishing Policy

Our Company, our People
• 1,700 employees across Germany, ranging from distributors/drivers to managers, smoking chefs and subsidiary directors
• Wide-ranging expertise in the field of fish and seafood
• Long-term experience in throughout the process, from the fishing source to the distribution to customers
• Sustainability as a primary concern
• Directed by entrepreneurs
• Abides by high social standards; collective wage agreement
• Greets around 2000 visitors each year (Customers, Media, Politics)
Products and assortment

• Constant surveillance of the species in terms of resources and protection of the species
• Cancelling fishing of very endangered populations (e.g. Red Tuna)
• Removing polluted fish from the assortment (e.g. Scorpionfish, red snapper)
• Analyzing and assessing polluted fish-species by on-site inspections (e.g. Swordfish from the Indian Ocean)
• Supporting Social-projects

=> Deutsche See faces challenges and consequently implements new policies and sets a standard for the entire Fishprocessing industry
Deutsche See is bring in an action against VW (Volkswagen AG) and claims a compensation of about 12 Mio. €. Reason is the manipulation of exhaust emissions in 500 company cars. „We are very disappointed and feel ourselves cheated and betrayed. Eco friendly mobility was the basic idea“, says CEO Egbert Miebach.
Stakeholders Seafood: University Kiel and GMA

Example: GMA is running trials in „Life Cycle Assessment“ for Seafood
Aquaculture feed

Is salmon becoming vegetarian?

Cow salmon? Or maybe Cowmon or Calmon? Or even FRANKENFISH?
Fishes of Aquaculture/SALMON = Vegetarians?

Development of fish meal utilization in Salmonids diets for aquaculture (Schulz, 2014)
Only vegetarian raw materials?

<table>
<thead>
<tr>
<th>Raw materials used for salmonid feeds and feeds for other species like pangasius and tilapia</th>
<th>Inclusion (as % of raw materials)</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates &amp; binders incl beans &amp; peas</td>
<td>19.0%</td>
<td>Australia, Canada, Chile, Germany, UK, USA, Vietnam.</td>
</tr>
<tr>
<td>Fishmeal</td>
<td>16.6%</td>
<td>Chile, China, Denmark, Iceland, Ireland, Norway, Panama, Peru, UK, USA.</td>
</tr>
<tr>
<td>Soy protein concentrate</td>
<td>15.3%</td>
<td>Brazil</td>
</tr>
<tr>
<td>Vegetable oil</td>
<td>14.5%</td>
<td>Argentina, Baltics, Canada, Chile, Germany, Netherlands, Russia, UK</td>
</tr>
<tr>
<td>Fish oil</td>
<td>9.8%</td>
<td>Chile, China, Denmark, Iceland, Ireland, Norway, Panama, Peru, UK, USA.</td>
</tr>
<tr>
<td>Animal by-products</td>
<td>6.7%</td>
<td>Argentina, Belgium, Brazil, Canada, France, Germany, Italy, Spain, USA.</td>
</tr>
<tr>
<td>Wheat gluten</td>
<td>5.5%</td>
<td>Argentina, Belgium, Canada, China, France, Germany, Lithuania, Russia, UK, USA</td>
</tr>
<tr>
<td>Other vegetable proteins</td>
<td>3.5%</td>
<td>Argentina, Dubai, Philippines, Vietnam, USA</td>
</tr>
<tr>
<td>Sunflower meal</td>
<td>3.1%</td>
<td>Argentina, Lithuania, Russia, Ukraine</td>
</tr>
<tr>
<td>Maize gluten</td>
<td>2.6%</td>
<td>Belgium, France, USA</td>
</tr>
<tr>
<td>Soy HiPro &amp; soy extracted</td>
<td>1.9%</td>
<td>Argentina, China</td>
</tr>
<tr>
<td>Pea protein concentrates</td>
<td>0.7%</td>
<td>Canada, China, Germany</td>
</tr>
<tr>
<td>Oil seeds</td>
<td>0.7%</td>
<td>Canada, UK</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Microingredients such as vitamins, minerals and pigments are not included in this summary.

source: Ewos
Forecast Development Feed

- “Fishmeal replacer” made from methane gas from segmentation by Cargill
- “Fish oil replacer” made from algae oil from sugar cane by Bunge
- Insects: as a valuable source of protein and oil
- Protein carrier: SPC, SPI, corn- and wheat gluten
- Protein from “Duckweed"
- “Supplementary fishmeal fractions”, like cholesterol, amino acids or fatty acids
Forecast Development Sustainability

- Breeding
- Netfishing development
- New feeding concepts, new raw materials, new feed additives
- New pond systems
- Universities bring new results
- and others.......... !!!!!!!!
Conclusion

Sustainability will be dynamically improved!

Development will come and will bring progress!!!
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Mr. Marcio Castro des Souza, FAO, Senior Fishery Industry Officer

...as well as a big “Thank You”
to all the fish to feed us!!!
EURODUNA Rohstoffe GmbH

Schusterring 23
D-25355 Barmstedt
Tel: (+49) 4123/9023-0    Fax: (+49) 4123/2175
Mail: Partners@Euroduna.com
www.EURODUNA.com