THE GREAT BALANCING ACT

The world must achieve a “great balancing act” in order to sustainably feed 9 billion people by 2050. Three needs must be met at the same time.

CLOSING THE FOOD GAP

60% Required increase in food calories to feed 9 billion people by 2050

SUPPORTING ECONOMIC DEVELOPMENT

28% Global population directly or indirectly employed by agriculture

REDUCING ENVIRONMENTAL IMPACT

24% Global greenhouse gas emissions from agriculture
Animal sourced food
Farmed Aquatics vs. Other Animal Source Foods

Conversion Efficiency

Emissions
## Comparison of Sustainability Indicators

<table>
<thead>
<tr>
<th>Protein Efficiency</th>
<th>FCR (kg/kg)</th>
<th>N emission (kg/t)</th>
<th>P emission (kg/t)</th>
<th>Land (t/ha)</th>
<th>Freshwater Use (m3/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>31.7</td>
<td>1.200</td>
<td>180</td>
<td>0.24-0.37</td>
<td>15,497</td>
</tr>
<tr>
<td>Chicken</td>
<td>4.2</td>
<td>300</td>
<td>40</td>
<td>1.0-1.2</td>
<td>3.918</td>
</tr>
<tr>
<td>Pork</td>
<td>10.7</td>
<td>800</td>
<td>120</td>
<td>0.83-1.10</td>
<td>4,856</td>
</tr>
<tr>
<td>Finfish</td>
<td>2.3</td>
<td>360</td>
<td>48</td>
<td>0.15-3.70</td>
<td>5,000</td>
</tr>
<tr>
<td>Bivalves</td>
<td>not fed</td>
<td>-27</td>
<td>-29</td>
<td>0.28-20.0</td>
<td>0</td>
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</tbody>
</table>
ICN2 Second International Conference on Nutrition better nutrition better lives
19-21 November 2014, Rome, Italy

The FAO webcast page provides live transmissions of events held at FAO headquarters. For interpretation please select from the language menu on top left of the video. (The interpretation of proceedings serves to facilitate communication and does not constitute an authentic or verbatim record of the proceedings. Only the original speech is authentic)

Wednesday 19 November – Morning
Fish and Nutrition

- A source of the long-chain omega-3 fatty acids
  - Eicosapentaenoic acid (EPA)
  - Docosahexaenoic acid (DHA)
- Important for optimal brain and neural system development in children (1000 day window!)
- Lowers the risk of coronary heart disease related (CHD) mortality.
- A daily intake of 250 mg of EPA and DHA per adult gives optimal protection against CHD.
- At least two meals of fish a week!
Nutrition: Small fish vs. Big fish
Capture

Aquaculture

2011: 62.7 million MT
2012: 66.5 million MT
2013: 70.2 million MT
Fish demand driven by population and income growth

Population growth

Growth of GDP per capita: 2010-2020

<table>
<thead>
<tr>
<th>Fish Demand (mt)</th>
<th>2007 (baseline)</th>
<th>2030 (projection)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>9.0</td>
<td>18.7</td>
</tr>
<tr>
<td>Asia</td>
<td>86.4</td>
<td>186.3</td>
</tr>
<tr>
<td>Europe</td>
<td>19.4</td>
<td>23.4</td>
</tr>
<tr>
<td>L.A. &amp; C.</td>
<td>15.2</td>
<td>18.3</td>
</tr>
<tr>
<td>Northern A.</td>
<td>9.1</td>
<td>12.9</td>
</tr>
<tr>
<td>Oceania</td>
<td>1.1</td>
<td>1.8</td>
</tr>
<tr>
<td>World</td>
<td>140.3</td>
<td>261.2</td>
</tr>
</tbody>
</table>

Source: Estimation of FI Department
## Fish supply-demand gaps

<table>
<thead>
<tr>
<th>Region</th>
<th>Supply 2030</th>
<th>Demand 2030</th>
<th>S-D gap 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>11.7</td>
<td>18.7</td>
<td>-7.0</td>
</tr>
<tr>
<td>Asia</td>
<td>156.5</td>
<td>186.3</td>
<td>-29.8</td>
</tr>
<tr>
<td>Europe</td>
<td>18.6</td>
<td>23.4</td>
<td>-4.8</td>
</tr>
<tr>
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<td>16.2</td>
<td>18.3</td>
<td>-2.1</td>
</tr>
<tr>
<td>Northern A.</td>
<td>6.2</td>
<td>12.9</td>
<td>-6.6</td>
</tr>
<tr>
<td>Oceania</td>
<td>1.5</td>
<td>1.8</td>
<td>-0.3</td>
</tr>
<tr>
<td>World</td>
<td>210.7</td>
<td>261.2</td>
<td>-50.6</td>
</tr>
</tbody>
</table>

*Source: Estimation of FI Department*
Bridging the Gap

- Improved and better managed fisheries
- Sustaining (increasing!) aquaculture growth
- Reducing fish waste
### Sustaining Aquaculture Growth

<table>
<thead>
<tr>
<th>Aquaculture growth rate during 2007-2030</th>
<th>Expected APR (%)</th>
<th>Required APR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>4.0</td>
<td>5.6</td>
</tr>
<tr>
<td>Africa</td>
<td>7.2</td>
<td>11.5</td>
</tr>
<tr>
<td>Asia</td>
<td>4.0</td>
<td>5.3</td>
</tr>
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</tbody>
</table>

Source: Estimation of FI Department

- If countries aquaculture production follow the recent trend, expected aquaculture growth rate:
  - 4.0 percent annually.

- To feed growing and wealthier world population, required aquaculture growth rate:
  - 5.6 percent annually.
Sustaining Aquaculture Growth

If not?

............ In particular, per capita fish consumption in **Sub-Saharan Africa** is projected to decline at an annual rate of 1 percent to 5.6 kilograms during the 2010–30 period.

Source: Fish to 2030. World Bank 2014
Sustaining Aquaculture Growth

- There are many issues, challenges and opportunities. Biosecurity and Health Management should be considered as one of the top priorities among the issues to be addressed for sustaining the sector growth.
Disease control and health management: Where are we?
We have made:

- Serious investment
- Significant technology development
- Substantial capacity development
- Noteworthy awareness building
- Stringent trading standards
However, still:

- Many disease outbreaks
- Massive production and economic losses
- Clear trans-boundary movements of pathogens
Scientists eradicate deadly rinderpest virus

Elimination of virus that causes deadly cattle plague makes rinderpest only the second viral disease in history to have been wiped out by humans
Polio this week as of 14 January 2015

- More than 6 months have passed since the most recent case of wild poliovirus in Cameroon on the 9 July 2014. This indicates that progress towards stopping the epidemic has been made. However, outbreak response activities must continue and subnational surveys need to be conducted to ensure the rapid detection of any residual transmission.
- More than a year has passed since the last case of wild poliovirus in Ethiopia. With no new cases of wild poliovirus detected in the Horn of Africa since August 2014 in Somalia, outbreak response must continue.
- No new cases of wild poliovirus have been reported anywhere in the world this week.

Wild Poliovirus (WPV) cases

<table>
<thead>
<tr>
<th>Total cases</th>
<th>Year-to-date 2014</th>
<th>Year-to-date 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rohana Subasinghe – OIE Global Conference on Aquatic Animal Health
WSSV
WSSV
KHV

Rohana Subasinghe – OIE Global Conference on Aquatic Animal Health
EUS
EMS/AHPNS
Success stories
We should not be complacent!

From past experience it is clear that the producers will always attempt to bridge the supply and demand gap, even forgetting the issues and concerns of sustainable production, leading to serious environmental and social impacts, including disease, which should be avoided at all cost.
Some food for thought for future

- Aquaculture is a highly complex sector!
- Aquatic (fluid) environment and its’ trans-boundary nature
- Over 500 species
- Different habitats
- Different food habits
- Different production systems
- Different production practices
Open-water culture
Marine vs. Freshwater
High-value vs. Low-value
Local vs. Exportable products
Industrial vs. Small-scale
TIME TO RETHINK!
- Nearly 70% production come from small-scale sector
- Freshwater tropical species dominates global production
- Provides food, nutrition and employment
- Most farmers are poor with little capacity and no access to services!
Disease costs are too high for small-scale sector to survive
Most technologies are unavailable and unaffordable to the small-scale farmers
Poverty drive them to find affordable solutions to save their crops
Governance structures in most countries do not help survival of the small-scale sector!
While high-value species are important internationally traded commodities, bridging the future supply and demand gap at local levels can only be achieved through increased production of species low in food chain.

Diseases, mortalities and economic losses prevail in aquaculture of many species of fish low in food chain.

Parasites (known/common?), bacteria (known/common?) and virus (unknown) contribute to these losses.
SPECIAL ISSUE ARTICLE

Economic costs of protistan and metazoan parasites to global mariculture

A. P. SHINN1,2*, J. PRATOOMYOT3, J. E. BRON2, G. PALADINI2, E. E. BROOKER2 and A. J. BROOKER2

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2 Institute of Aquaculture, School of Natural Sciences, University of Stirling, Stirling FK9 4LA, UK
3 Institute of Marine Science, Burapha University, Chonburi, Thailand

(Received 4 May 2014; revised 4 July 2014; accepted 6 July 2014)
Study reviewed the top 69 aquatic species cultured in brackish and marinewaters, which accounted for 94% of the total tonnage derived from mariculture in 2011.

Provides estimates for losses incurred as a consequence of key parasite-associated disease events reported worldwide.
Although it has not been possible to provide a single resolved value for the economic impact of parasites on global mariculture, this study clearly demonstrates that parasitic infections remain an important source of economic loss.
Without a step-change in management priorities and a concerted move towards more integrated pest management strategies, it is evident that as the global aquaculture industry grows and intensifies, the level of parasite infections will similarly rise as will the attendant economic costs of parasitism.
Same with other pathogen types?
Do not forget mortalities and losses due to non-infectious diseases stemming from management deficiencies!
Changing disease landscapes

- Over 70 percent of human diseases originate in animals, and our expanding human population is inhabiting more wilderness while becoming ever more reliant on animals for food.
A PRESSURE–STATE–RESPONSE FRAMEWORK FOR PLACING HEALTH IN A SUSTAINABLE DEVELOPMENT CONTEXT

Pressure
- Changing landscapes, encroachment of natural ecosystems, globalization, climate change, land pressure and marginalization of the poor, altering host environments and the host availability to existing pathogens

State
- Diminished agro-ecological and social resilience, leading to disease emergence, spread and persistence, affecting humans, animals and ecosystems

Response
- Health protection policies and strategies integral to sustainable development
HEALTHY FOOD SYSTEMS

PUBLIC HEALTH

 Pets + feral dogs/cats

 Waste

 Arthropod vectors

 Soil/water

 Wildlife

 Feed/food crops

 Healthy plants

 Healthy animals

 Healthy fisheries and forestry

 Healthy food and agriculture

 Healthy ecosystems

 Food security and safety

 Healthy humans

 * pathogen flows
At least to me:

- What is most important is to develop effective science-based health management technologies and strategies which are accessible and affordable to the resource-poor small-scale sector, and
At least to me:

- Make a concerted effort to develop capacity among this small-scale production sector, to manage their systems and practices better, thus reducing the eminent biosecurity risks.
Thank You!