# SUSTAINABLE AQUACULTURE IN ASIA – SHARING BEST PRACTICES AND IDEA

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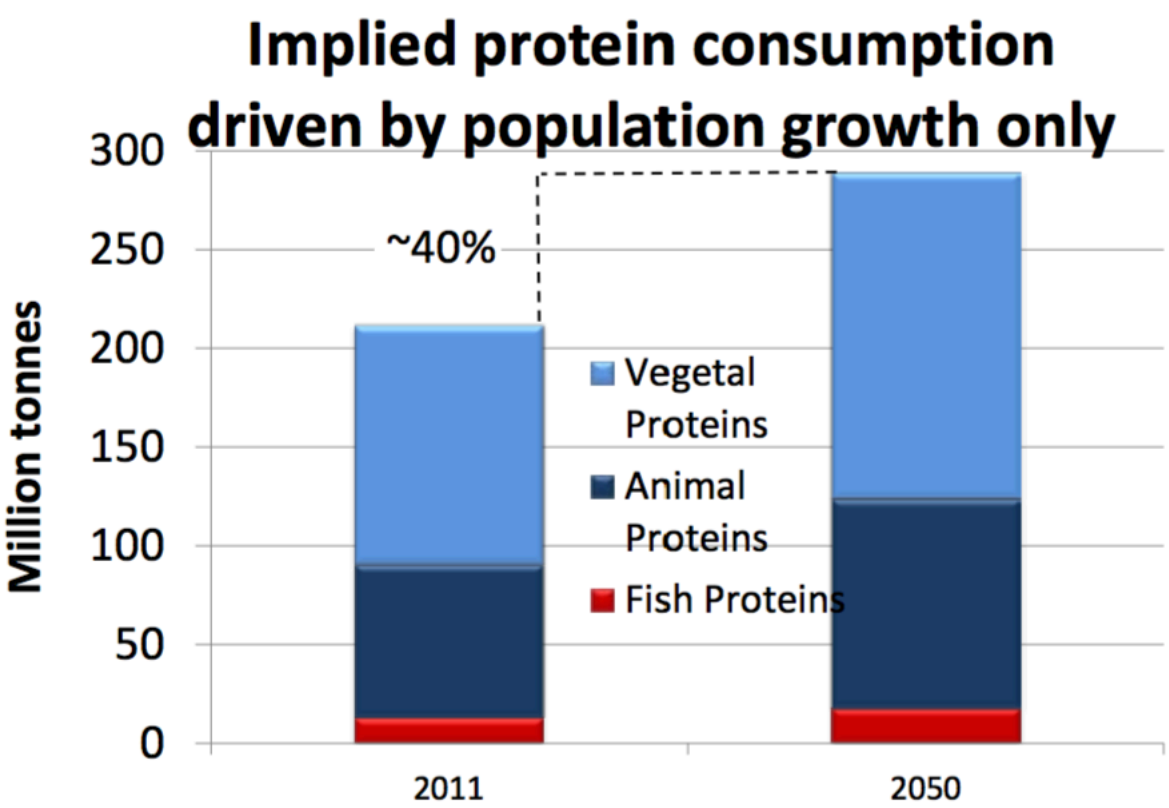
EELO SOLUTIONS

*Save Money through Practical Energy, Resources, and Carbon Management*

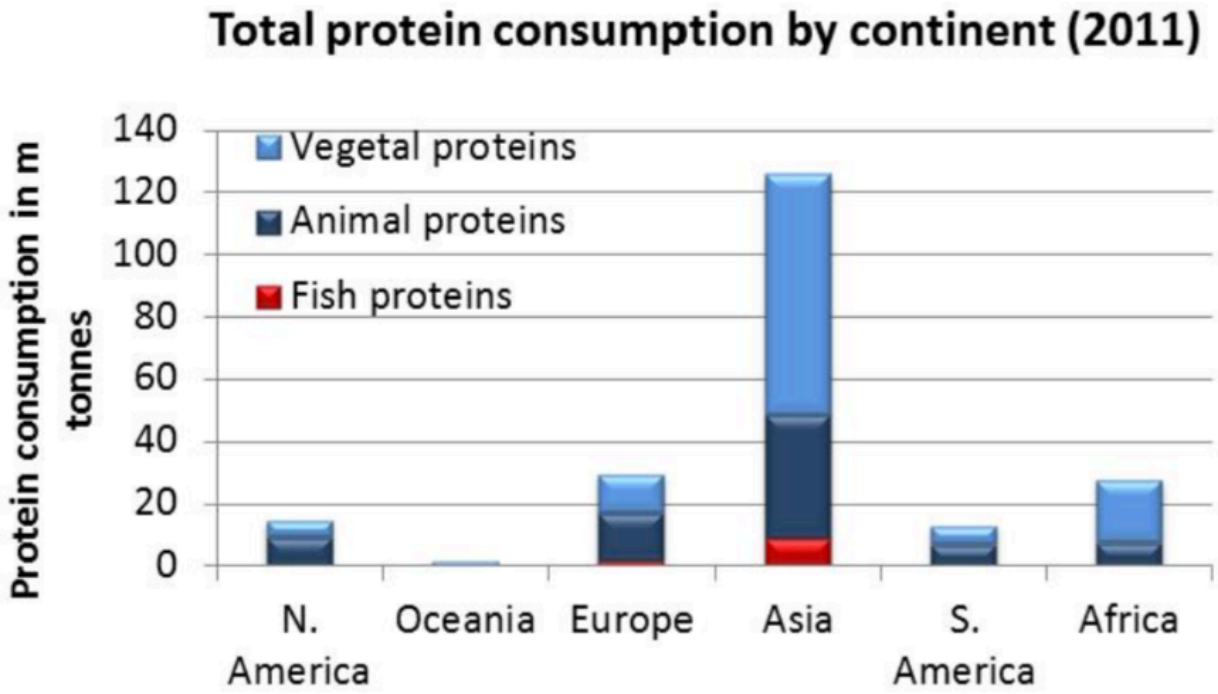
*"The health of our planet as well as our own health and future food security all hinge on how we treat the blue world"*

- *UN Food and Agriculture Organization Director-General José Graziano da Silva, 2014*

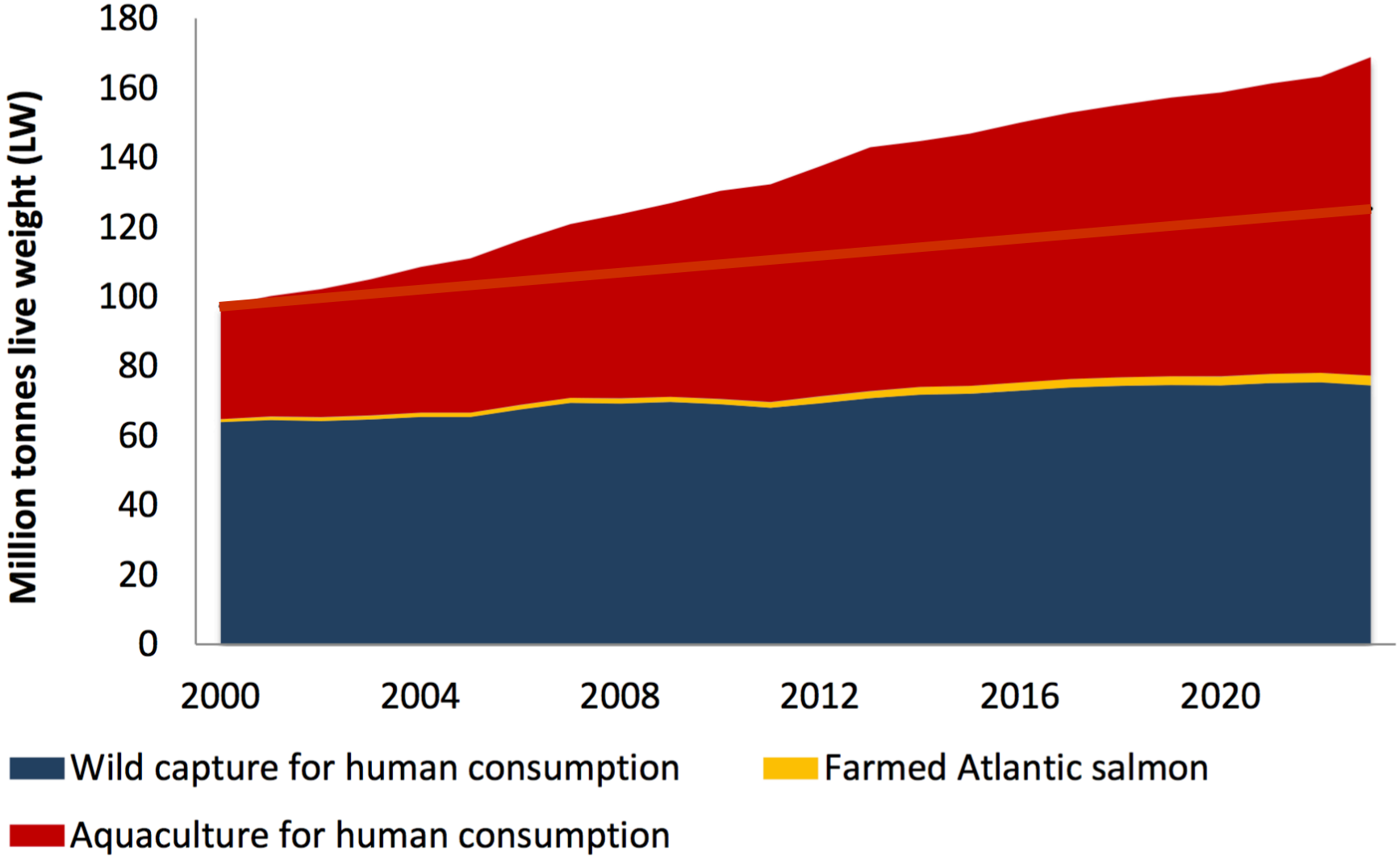




Asia is the largest protein consumer

Over 85% fishers and fish farmers are Asian

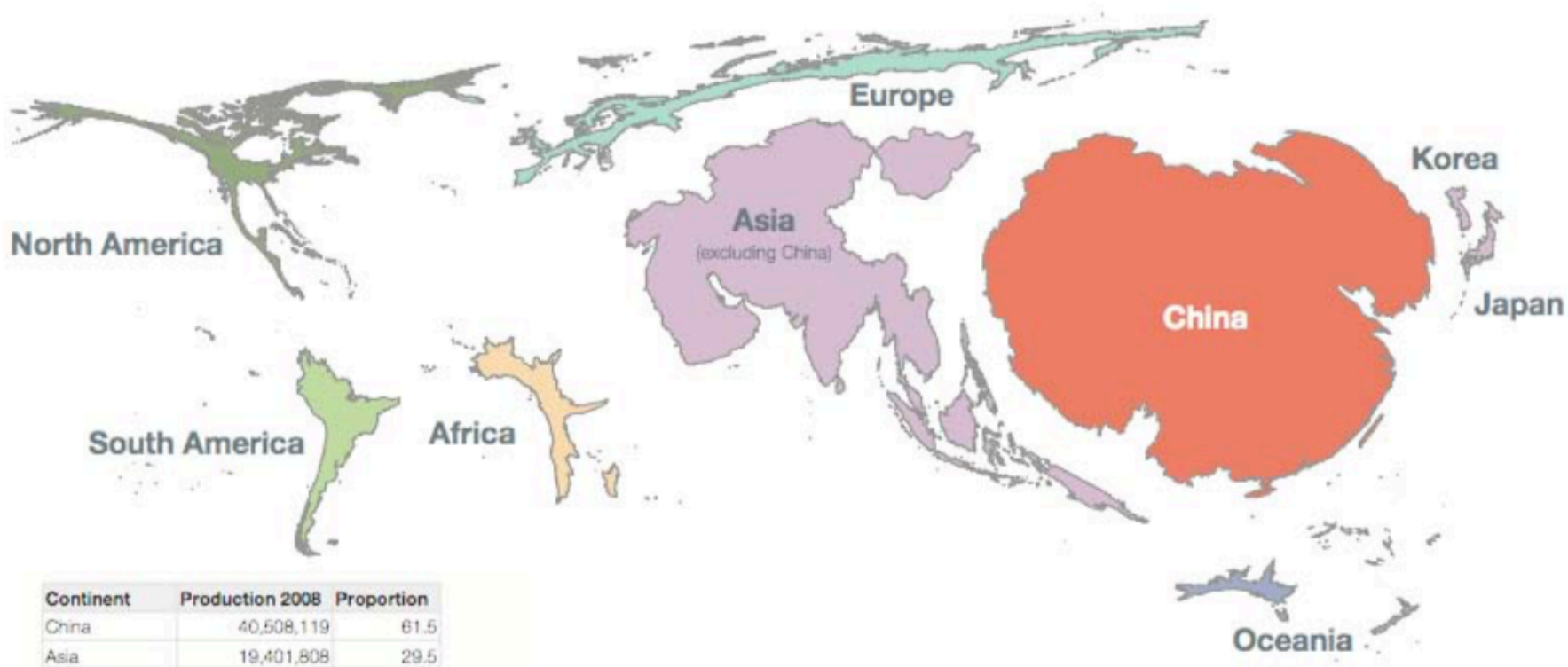



Source: Salmon Farming Handbook 2015 by Marine Harvest with data from FAO, United Nations




1 Million tonnes of live weight ~ $1 Billion USD value

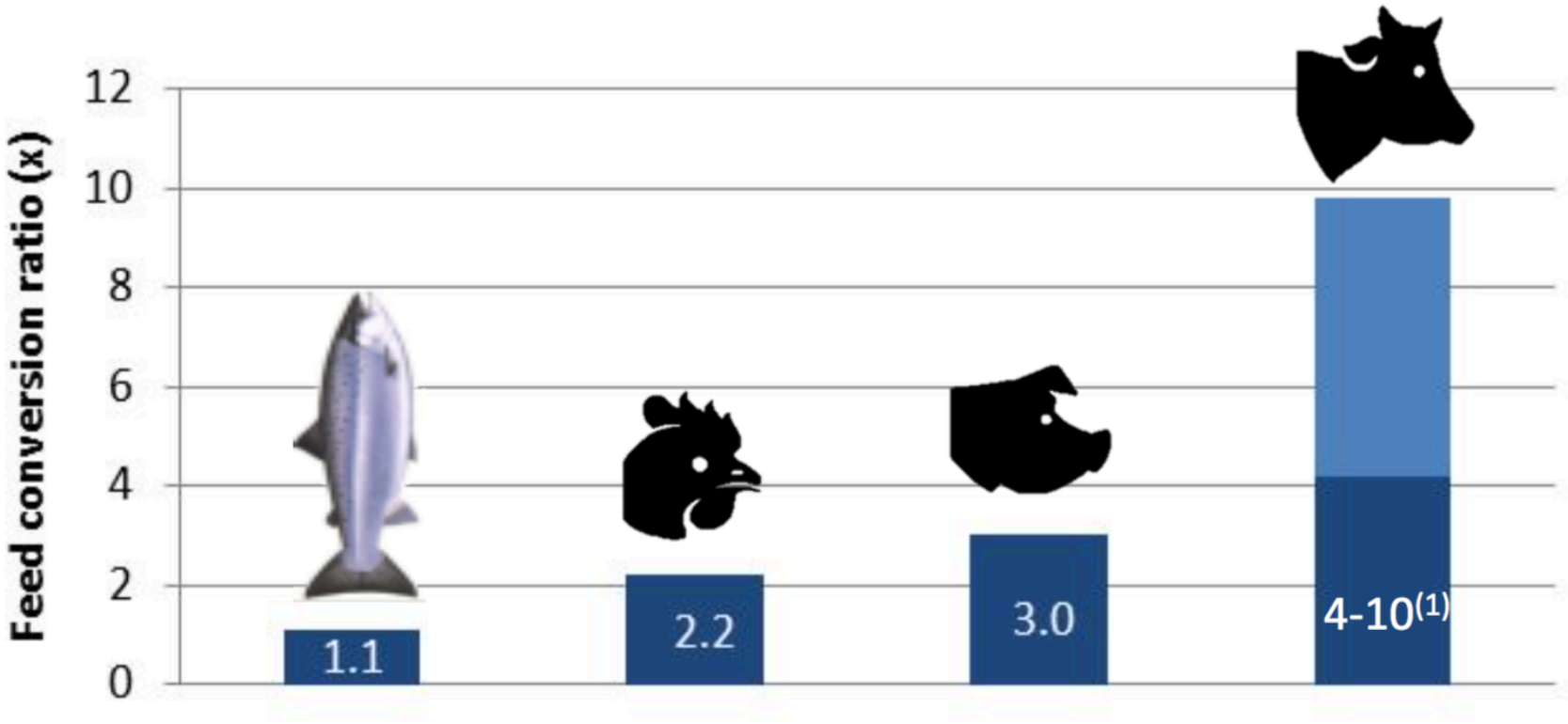
Source: Salmon Farming Handbook 2015 by Marine Harvest with data from FAO, World Bank Fish to 2030 (2013), OECD




| Continent | Production 2008 | Proportion |
|---|---|---|
| China | 40,508,119 | 61.5 |
| Asia | 19,401,808 | 29.5 |
| Europe | 2,341,648 | 3.6 |
| South America | 1,461,061 | 2.2 |
| North America | 985,792 | 1.5 |
| Africa | 952,133 | 1.4 |
| Oceania | 176,181 | 0.3 |

Asia produces 89% of all aquaculture worldwide

Source: The future of fish in Asia (2011) by Responsible Research with data from Hall, S.J., A. Delaporte, M. J. Phillips, M. Beveridge and M. O'Keefe. 2011. Blue Frontiers: Managing the Environmental Costs of Aquaculture. The WorldFish Center, Penang, Malaysia.




Note (1): FCR of cattle varies between 4.2 and 9.8 depending on feed (finished on cereal or grass)

| | | | | |
|---|---|---|---|---|
| Energy retention | 27% | 10% | 14% | 27% |
| Protein retention | 24% | 21% | 18% | 15% |
| Edible yield | 68% | 46% | 52% | 41% |
| Edible meat pr 100 kg fed | 61 kg | 21 kg | 17 kg | 4-10 kg |

**Fish is cold blooded and has the most edible meat**

Source: Salmon Farming Handbook 2015 by Marine Harvest with data from Ytrestolyl et al., (2014), National Beef Association UK (2014), Volden, H and N. I. Nielsen, (2011) Energy and 14 metabolizable protein supply, www.journalofanimalscience.org, Skretting (2012) Delivering SUSTAINABLE FEED SOLUTIONS for aquaculture, SINTEF Report (2009) Carbon Footprint and energy use of Norwegian seafood products FAO, World Bank Fish to 2030 (2013), OECD




| | | | | |
|---|---|---|---|---|
| Carbon footprint<br>kg CO2/kg edible meat | 2.9 kg | 3.4 kg | 5.9 kg | 30 kg |
| Water consumption<br>litre/kg edible meat | 1,400 litre (1) | 4,300 litre | 6,000 litre | 15,400 litre |

Note: 1) The figure reflects traditional smolt production in plants with water flow through. Recirculation plants, which are being implemented to an increasing extent, requires significantly less fresh water (up to 99% of the fresh water is recycled).

Fish can have the lowest carbon and water footprint

Source: Salmon Farming Handbook 2015 by Marine Harvest with data from Marine Harvest, Mekonnen, M.M. & Hoekstra A.Y. (2010), Ytrestøyl et. al. (2014), SINTEF Report (2009) Carbon Footprint and energy use of Norwegian seafood products, IME (2013)

## Development of raw materials in salmon feed in Norway


Sources: Ytrestøyl et al (2014), NOFIMA, FAO (2012) *World Fisheries and Aquaculture*, UN (2010), FAO (2014) *World Fisheries and Aquaculture*

**Fish feed can incorporate more vegetable feed to further reduce carbon impact**

Source: Salmon Farming Handbook 2015 by Marine Harvest with data from Ytrestøyl et al (2014), NOFIMA, FAO (2012) World Fisheries and Aquaculture, UN (2010), FAO (2014) World Fisheries and Aquaculture

| | | | |
|---|---|---|---|
| Fishery | Destruction and lost of habitat | Overfishing | By-catch |
| Aquaculture | Resilience of wild stock | Pollution and disease | Escapes |
| Climate change | Ocean warming | Acidification | Nutrient depletion |

But fishing and fish farming has huge environmental impact and risks!

# Best Practices


Founded in 1997 by WWF and Unilever, Marine Stewardship Council (MSC) is among the best known for wild caught seafood


Global Aquaculture Alliance
Best Aquaculture Practices (BAP) standard, developed by the US-based Global Aquaculture Alliance (GAA), formed in 1997


Founded in 2010 by WWF and IDH (Dutch Sustainable Trade Initiative) the Aquaculture Stewardship Council (ASC) is an independent not for profit organization with global influence

# Value Proposition

- Aquaculture and fisheries will continue to grow with increasing population
  - $1B USD value per million metric tonne
  - ~ $20B from now to 2020
  - Aquaculture will be more important than wild-caught
- Need to address impacts on climate change:
  - Mitigation: lowest embedded GHG/energy, renewables!
  - Adaptation: changing environment
- But must follow best practices available

# Next step

- ADB is in a position to integrate energy, carbon, environment, and climate change into a true sustainable aquaculture program by applying best-in-class standards that are widely used in the world!
- Maybe a more in-depth session on this topic next year?

Food Security Forum

Safe, Nutritious, and Affordable Food for All

22-24 June 2016, ADB Headquarters

Source: Salmon Farming Handbook 2015 by Marine Harvest

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