PROFISH and the Fisheries Program at the World Bank

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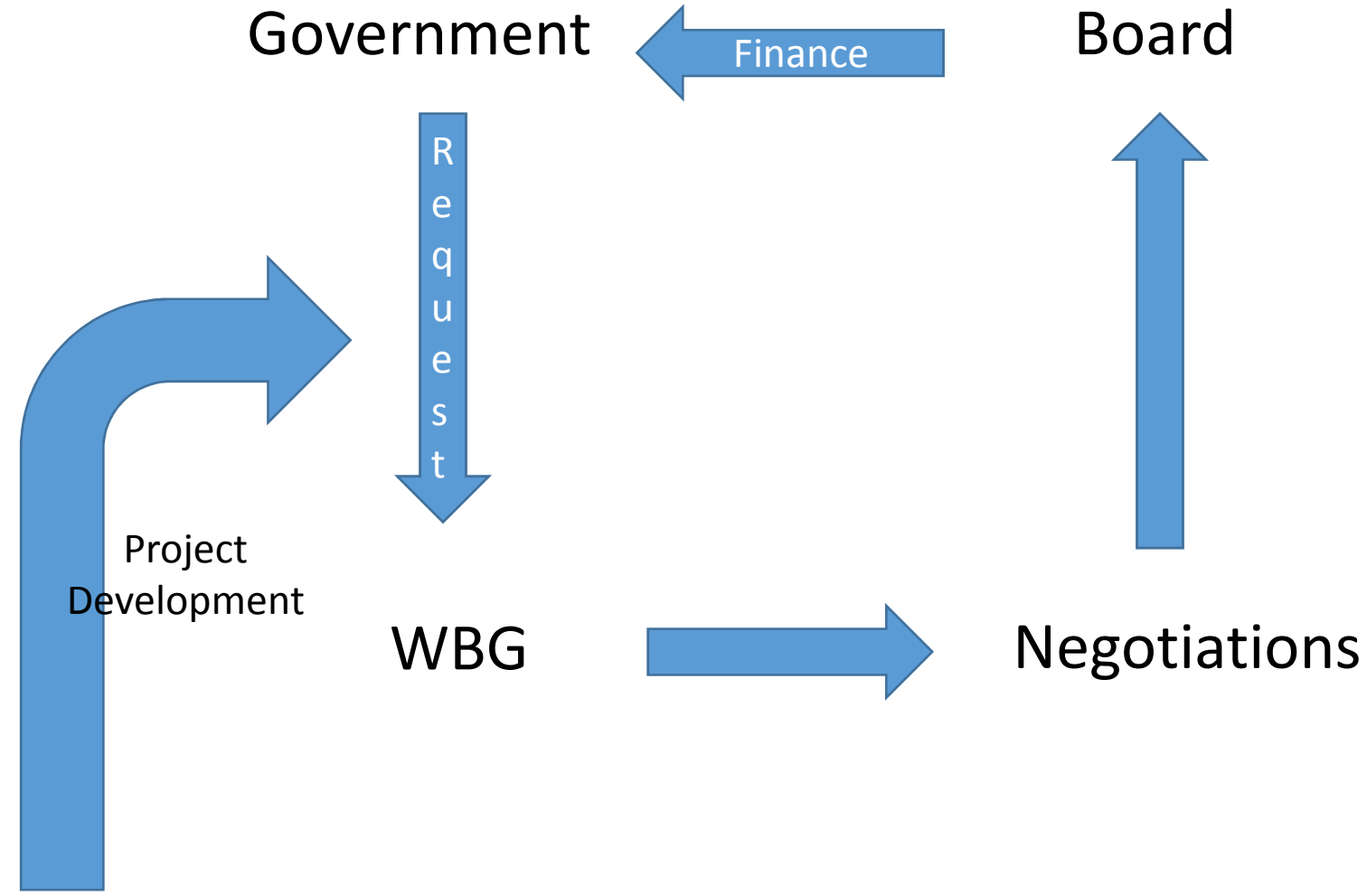
Environment & Natural Resources

Sustainable Poverty Eradication



Demand Driven Finance

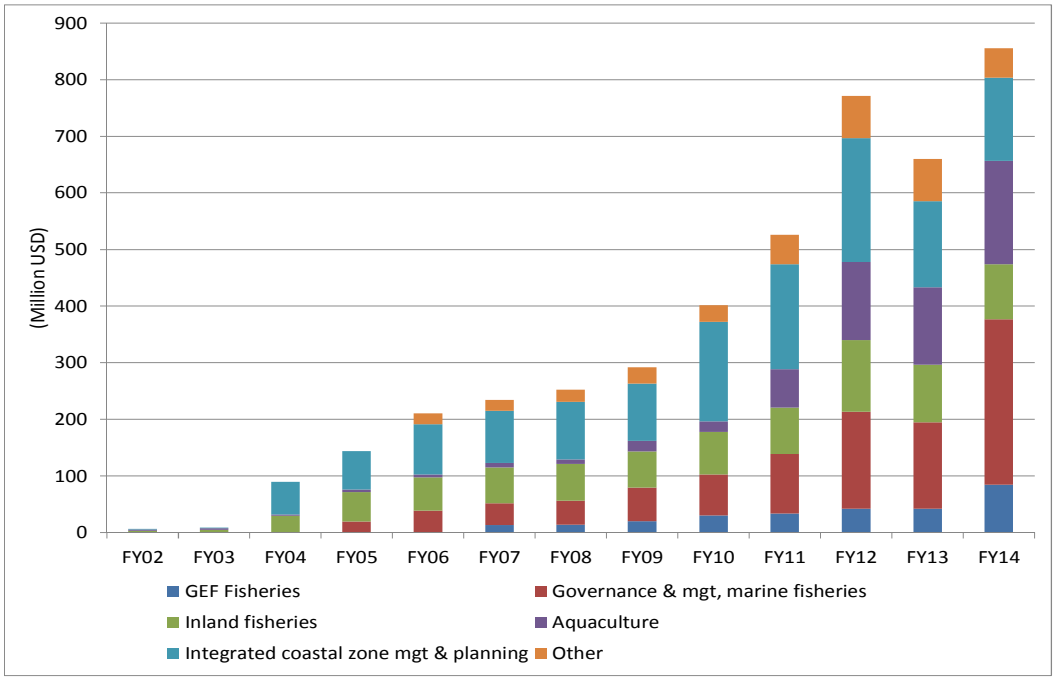
The Role of PROFISH MDTF:
De-Risking WBG and related donor lending and granting

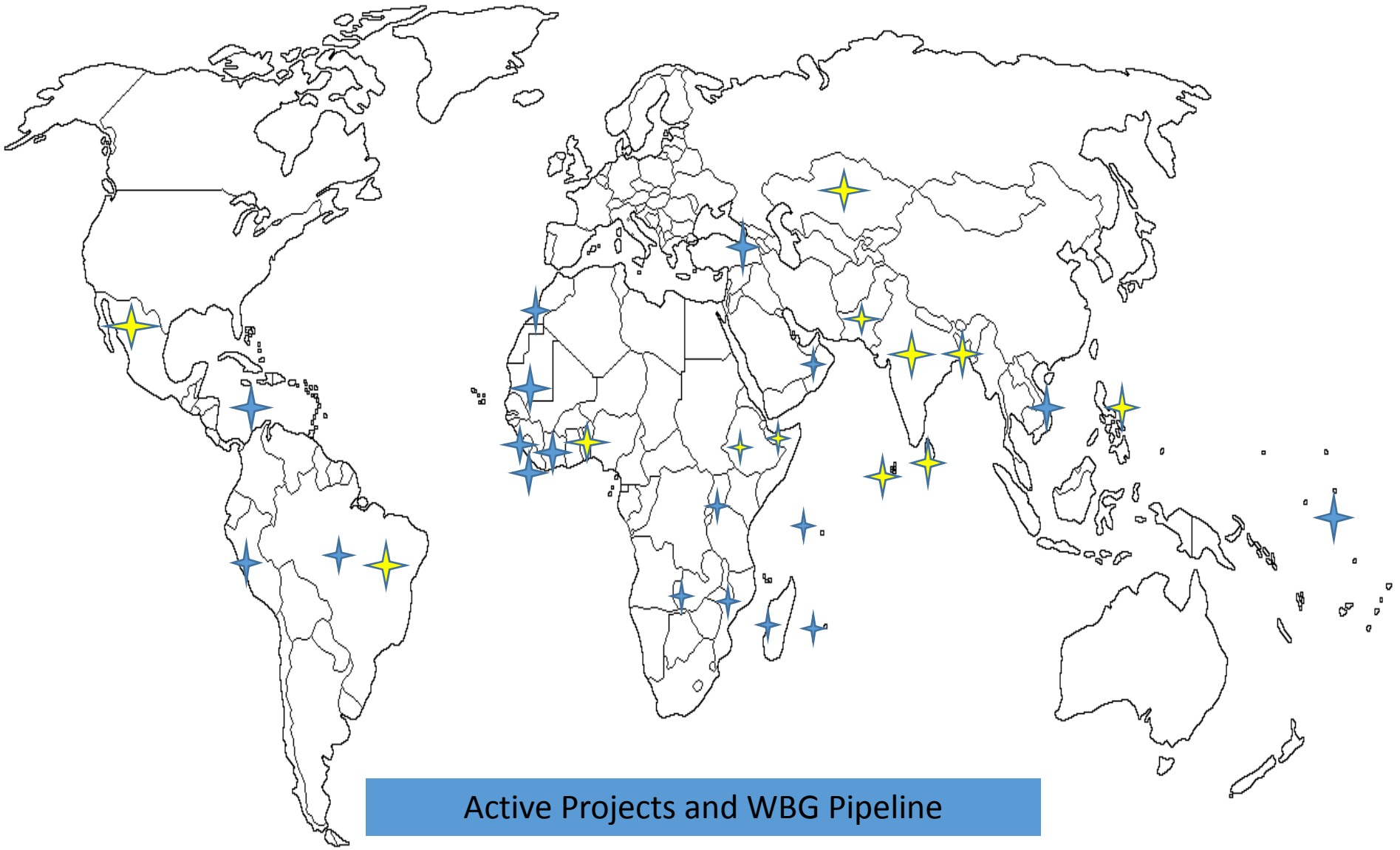
- ***A Pre-investment Facility*** **(inc. Strategic Analyses)**
- ***Global Knowledge Sharing & Project Coordination***
- ***Innovative Financial Instruments***

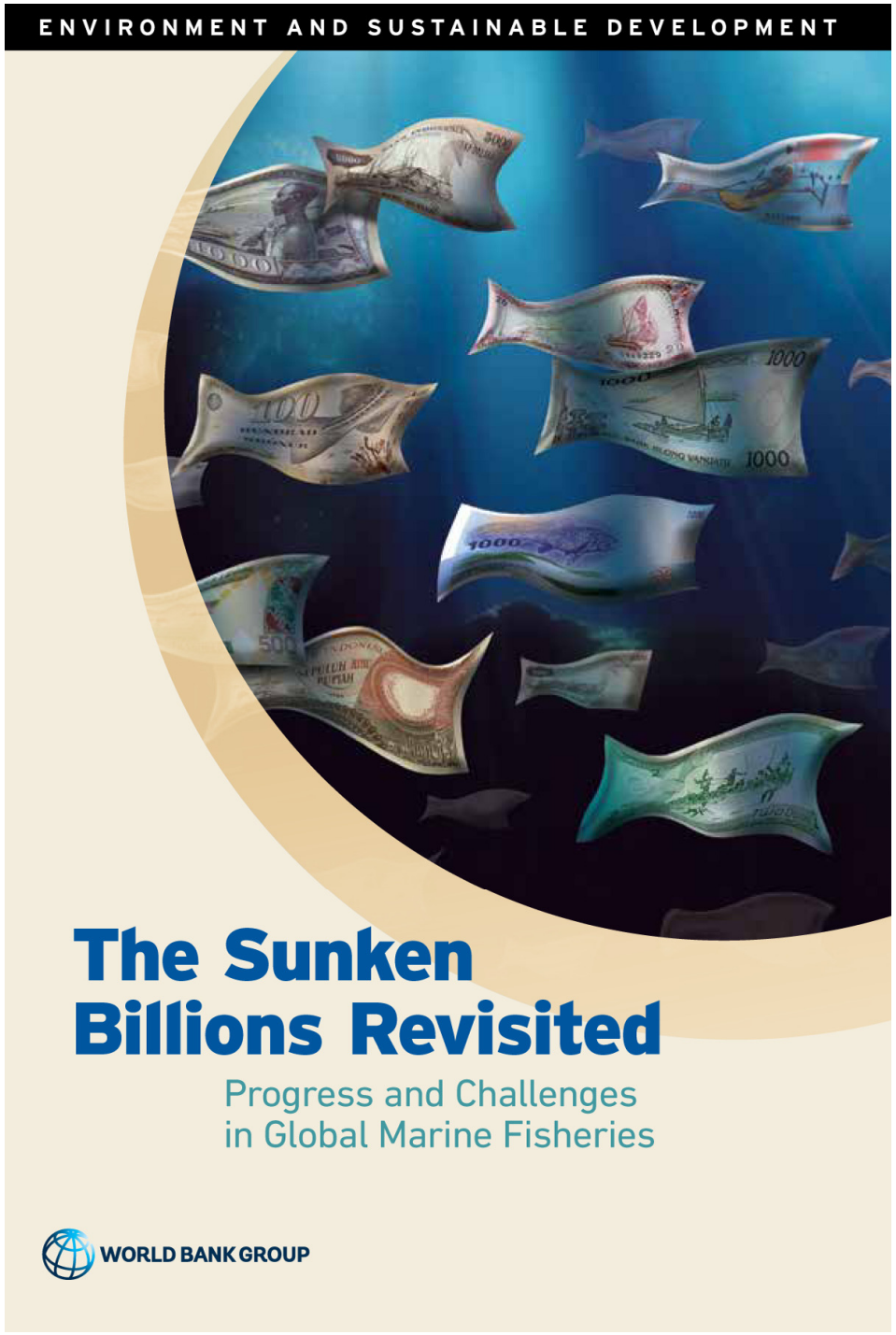
PROFISH 2005 - 2016

$6 million from PROFISH

$1.6 billion in WBG, GEF and private sector finance




Active Projects and WBG Pipeline



$83 Billion in revenues forfeit

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Seaweed Aquaculture for Food Security, Income Generation and Environmental Health in Tropical Developing Countries

To meet carbon emissions targets, more than 30 countries have committed to boosting production of renewable resources from biological materials and convert them into products such as food, animal feed and bioenergy. In a post-fossil-fuel world, an increasing proportion of chemicals, plastics, textiles, fuels and electricity will have to come from biomass, which takes up land. To maintain current consumption trends the world will also need to produce 50–70% more food by 2050, increasingly under drought conditions and on poor soils. Depending on bioenergy policies, biomass use is expected to continue to rise to 2030 and imports to Europe are expected to triple by 2020. Europe is forecast to import 80 million tons of solid biomass per year by 2020 (Bosch et al. 2015).

Producing large volumes of seaweeds for human food, animal feed and biofuels could represent a transformational change in the global food security equation and in the way we view and use the oceans. In 2012, global production of seaweeds was approximately 3 million tons dry weight, and growing by 9% per annum. Increasing the growth of seaweed farming up to 14% per year would generate 500 million tons dry weight by 2050, adding about 10% to the world's present supply of food, generating revenues and improving environmental quality (Table 1). Assuming a conservative average productivity from the best operating modern farms of about 1,000 dry metric tons per km^2 (1 kg per m^2), this entire harvest could be grown in a sea area of about 500,000 square kilometers, 0.03% of the oceans' surface area, equivalent to 4.4 percent of the US exclusive economic zone.

BENEFITS OF SEAWEED PRODUCTION

The dry-matter composition of seaweeds ranges from 10–30% protein, with red and green seaweeds typically higher than browns (Kim 2012). Harvest season is an important determinant of composition. The lipid portion is typically 1–5% of dry matter (Kim 2012). Taking an average of 19% protein and 3% lipid (Table 2), 500 million dry tons of seaweed would produce about 150 million tons of algae protein and 15 million tons of algae oil. Based on the amino acid profile and some issues with anti-nutritional factors in both seaweed and soy, algae protein can be thought of as roughly similar in value to soy protein. Algae oils, however, can contain long chain omega-3 fatty acids, which make them more comparable to fish oils in nutritional value. Currently, about 1 million tons of fish oil and 250 million tons of soy meal are produced annually (Pike & Jackson 2010, USDA 2015). Accounting for the different protein levels in soy meal compared to algae protein concentrate, 500 million tons of seaweed would represent about 20% of current soy-protein production. Even more dramatic is the potential for lipid replacement; algae oils could represent a 750% increase over current fish oil production. Given the importance of oils containing long chain omega-3 fatty acids, this could be a significant boost to human health, while eliminating the need for fish oil in aquaculture

The Ultimate Blue Business

Food and Agriculture Organization of the United Nations

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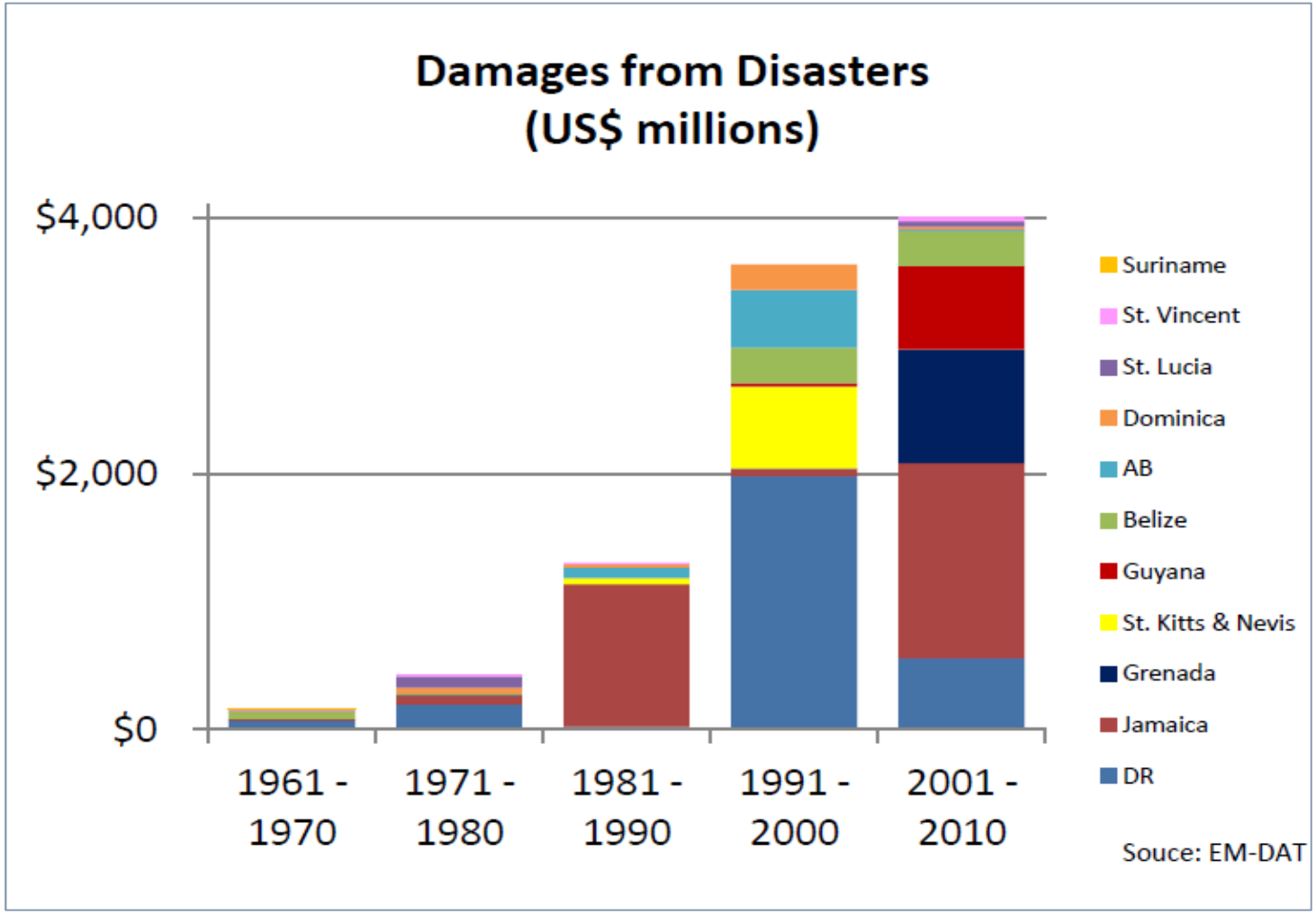
Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture
A handbook

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS/
THE WORLD BANK

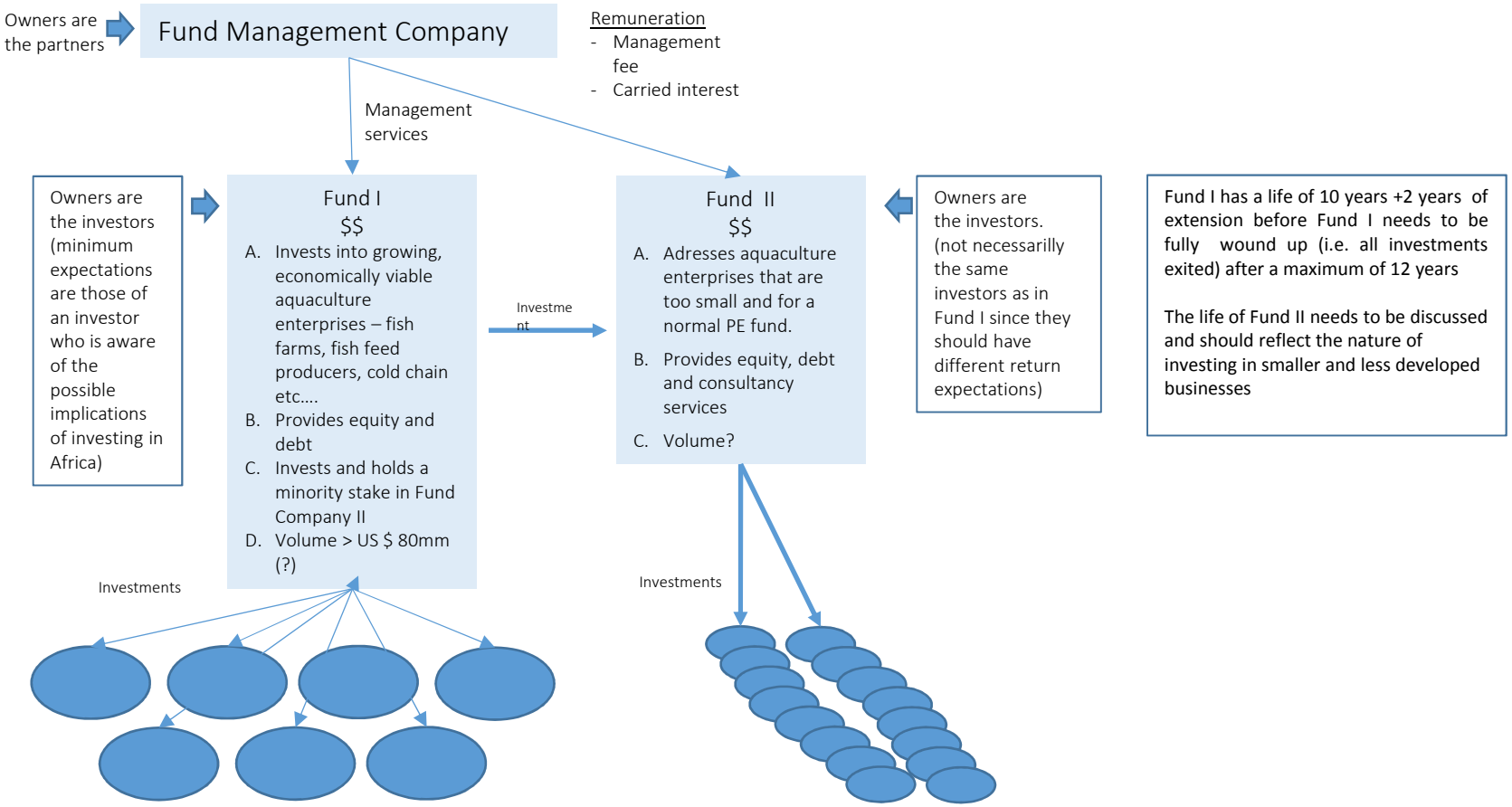
Rome, 2017

Making aquaculture safe for bankers

COAST (CFI): helping fishing communities get back on their feet



Aquaculture Fund – Hybrid Structure



The Blue Economy

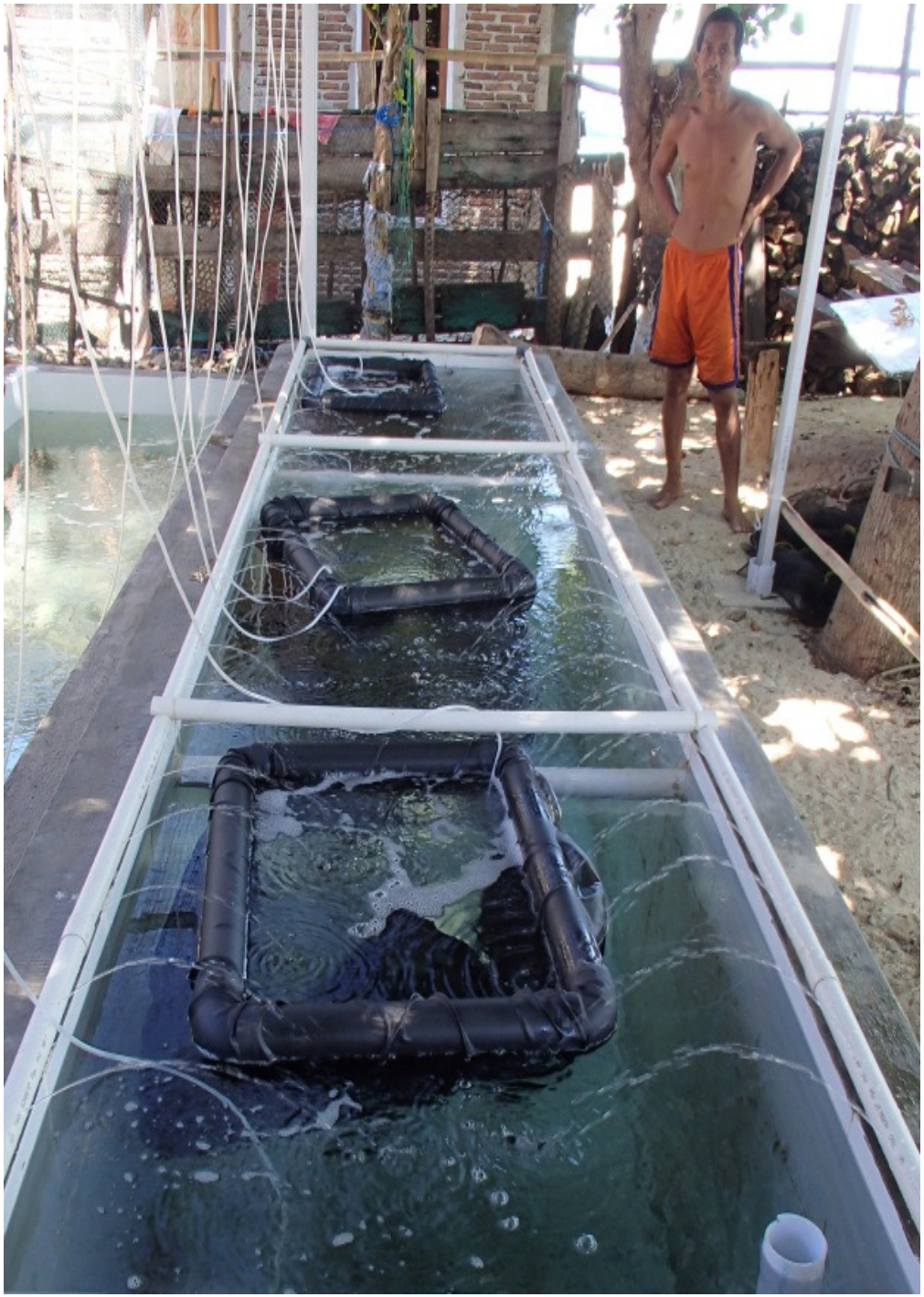
- **Policy reform & creating alternatives to ecosystem abuse**
- **Building well-planned, equitable blue (e.g. aquaculture) economies**
- **Guiding long term investments: public and private**

30 Year Business Plan

- **Stock and habitat recovery likely to take a while**
- **Too long for politicians or WBG lending**
- **Need manageable (5 year) phases**
- **Cost/Benefit of investing in the longer term**
- **Jobs + Recovery of Natural Capital**

Phase I: Practical Investing

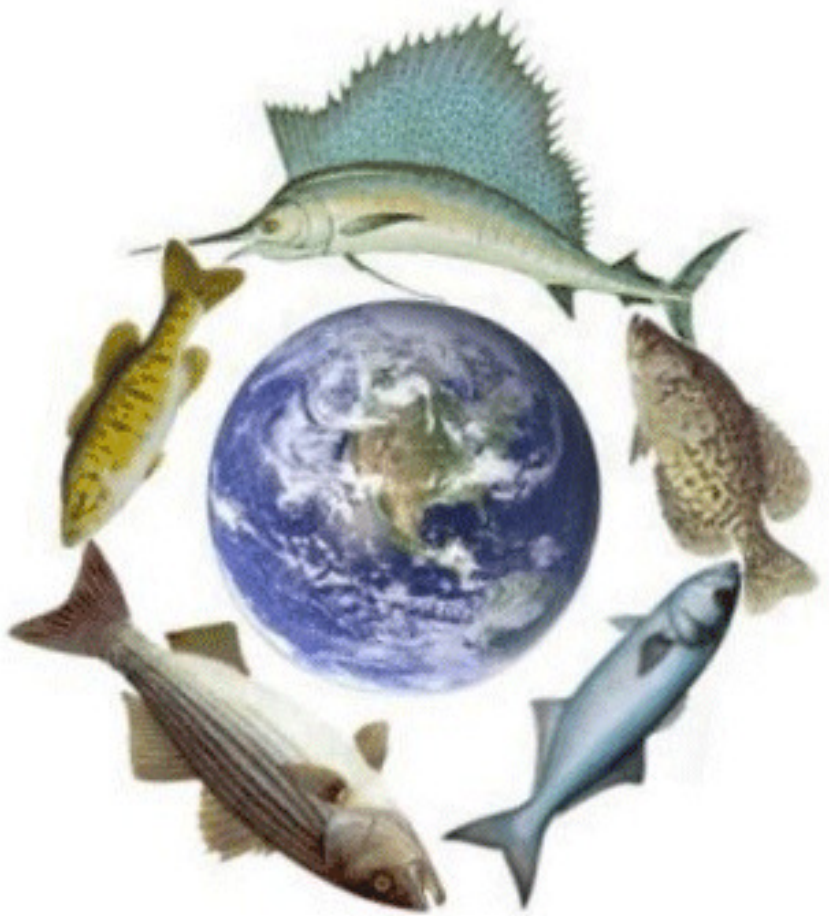
- Leading with credible (SME) investment opportunities
- Long term vision for regaining natural capital



“Blue” Businesses *depend upon a living ocean*

Adding Value to Marine Protected Areas – making money by enhancing habitat for biodiversity

- Growing seaweed MPAs (Costa Rica)
- Restocking keystone fish or other species to clear algae from reefs (Discussed for Brazil)
- Coral Reef rebuilding (Indonesia)



Businesses producing high value per weight products (to cover high transport costs)

- Marine fish and shellfish aquaculture (all over)
- Micro algae for high value Omega-3 oils (Cote d'Ivoire)
- High value tree plantations, cut flowers and other top quality horticulture (Kenya)
- High-tech ingredients (e.g., algae extracts for next generation battery terminals, x-ray imaging, anti-fouling paints, artificial skin, et al.) (from articles in the scientific literature)
- Ornamental fish (Indonesia, Cameroun)

Tourism and Support Businesses

- Small-scale solar, hydro and/or wind generation to supply local power grids (all over)
- Port-a-Loos (Mexico)
- Recreational fishing guide services (all over)
- Marketing and promotional services for homestay tourism
- Fish-out ponds with "catch-'em-and-cook-'em" restaurants for local tourism (Egypt)
- Indigenous sailboat tours and/or rentals (Malawi)

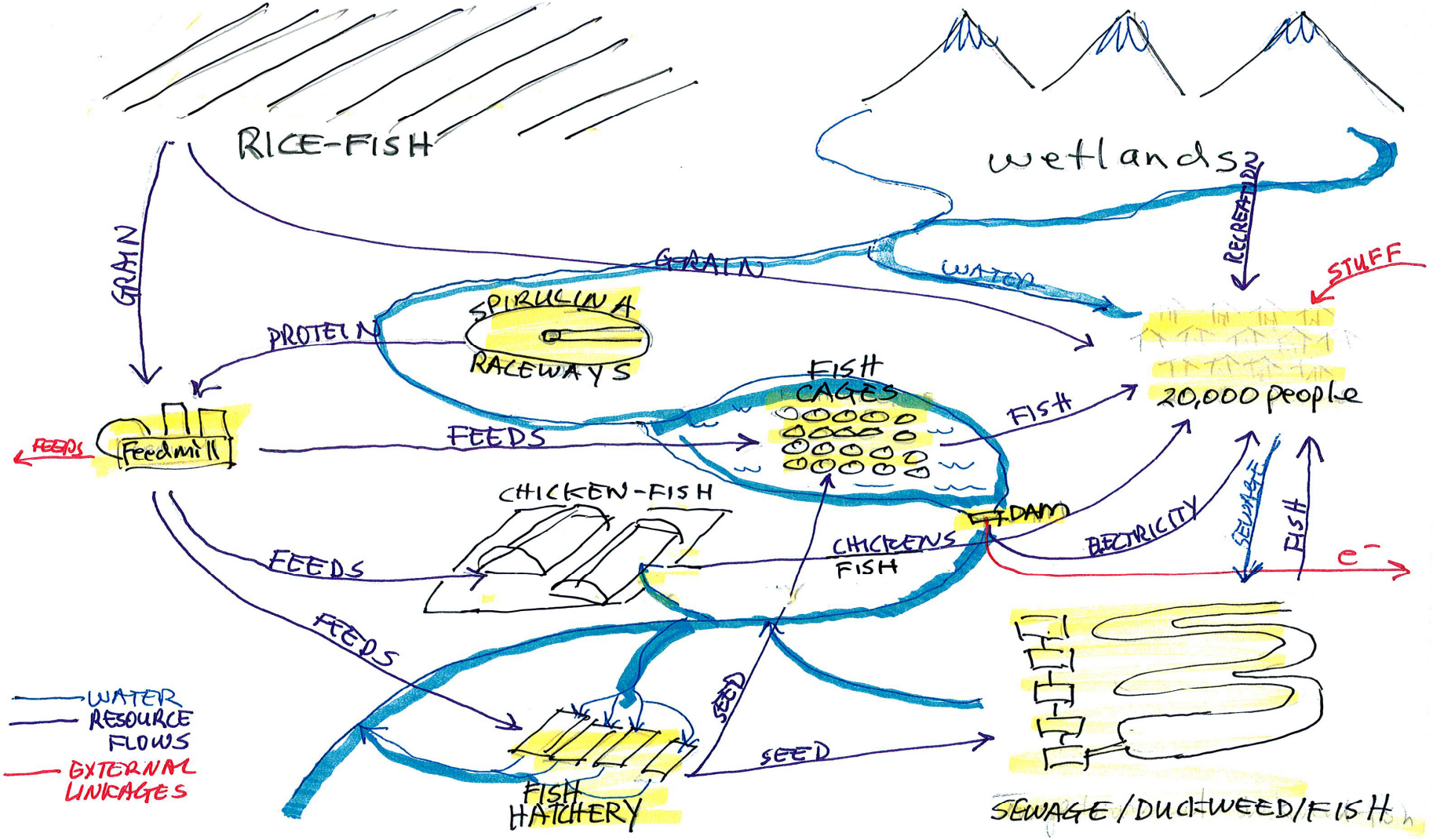
Payment for Ecosystems Services Subsidies - job creation while building ecosystem resilience

- Living reefs – oysters and other shellfish planted onto dead or artificial reefs (Indonesia, Bangladesh)
- Replanting/rebuilding mangrove habitats (all over with mixed results)
- (solar or wind) pumping cold, deep water into lagoons to increase productivity + reduce coral bleaching (proposed for Fiji)

Bluing Brown Stuff

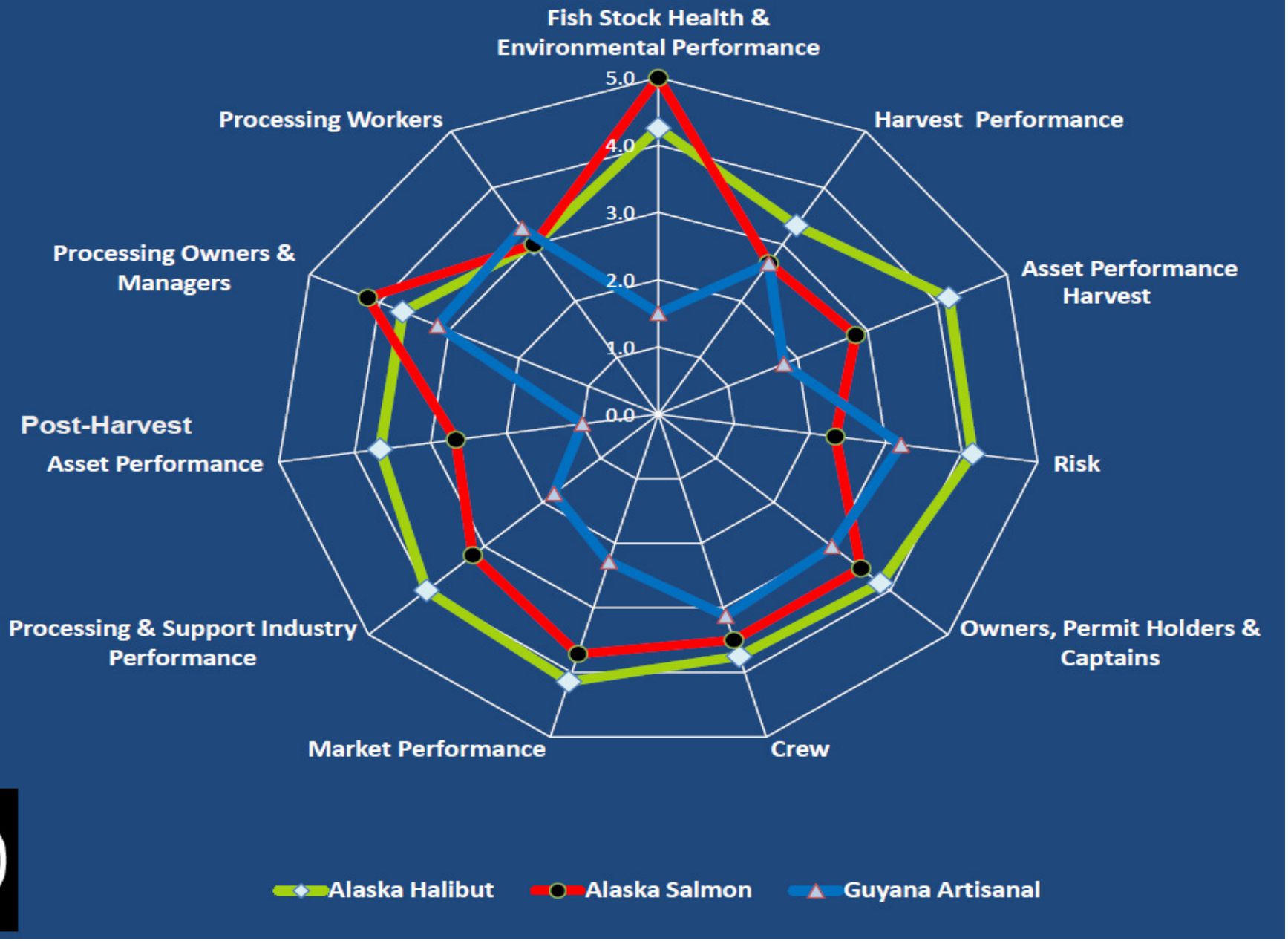
- Tanning fish leather (Thailand)
- Biogas/Silage (RSA)
- Wind mills (Europe)
- Solar fish preservation technology (All Over)

Intermediate Phases: Building Blue Economies



FAO/NANSEN – tracking the SDGs at a global scale

Fisheries Performance Indicators



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