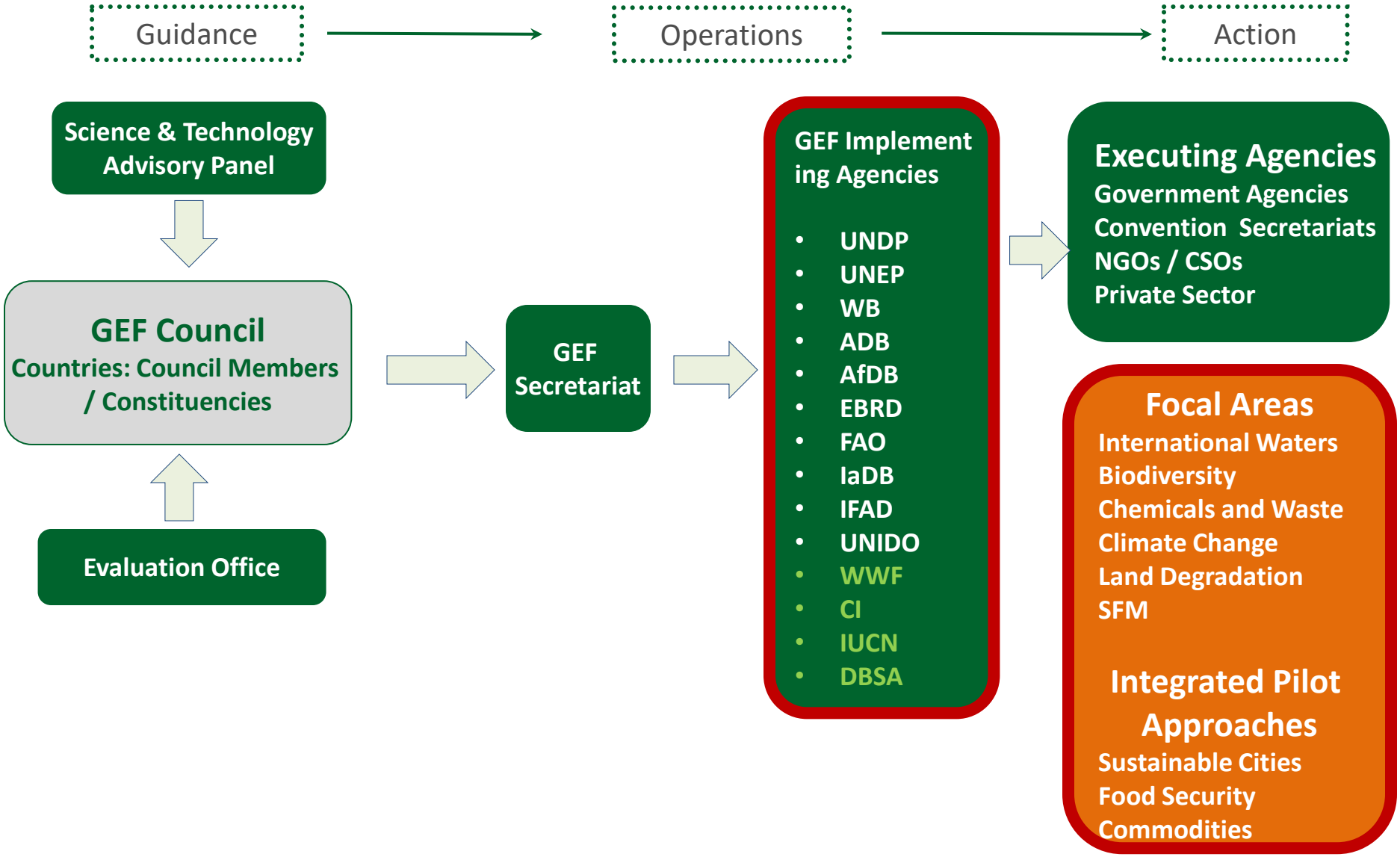
GEF-6 Strategic Programming

Blending Integrated Thinking with
Focal Area Objectives

How GEF Works: What's New for GEF-6

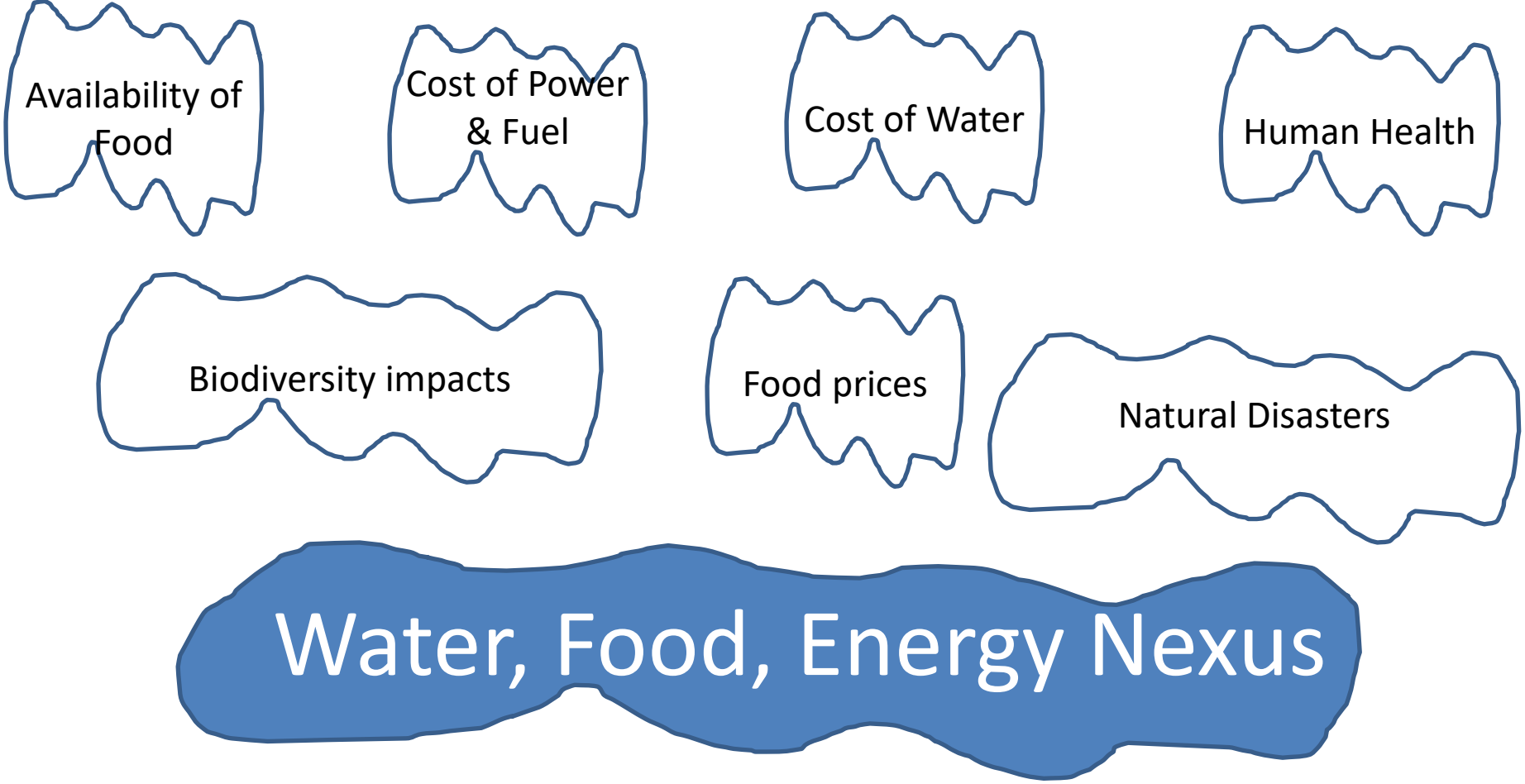


Integrated Thinking

- Drivers of environmental degradation are linked in complex ways
- Single issue analysis leads to “silo” thinking
- Systems analysis leads to integrated thinking
- Integrated thinking inspires creative and inclusive solutions
- Creative and inclusive solutions deliver environmental benefits aligned with GEF focal area objectives

Examples of Integrated Thinking

- Water, Food, Energy Nexus



Availability, distribution, access and sustainability of water, food, energy and their resilience in the face of climate change.

9. Managing the Human-interface: landscape/seascape approach

4.Water/Food/Energy/ Ecosystem Security Nexus

SFM 1: To maintain forest resources

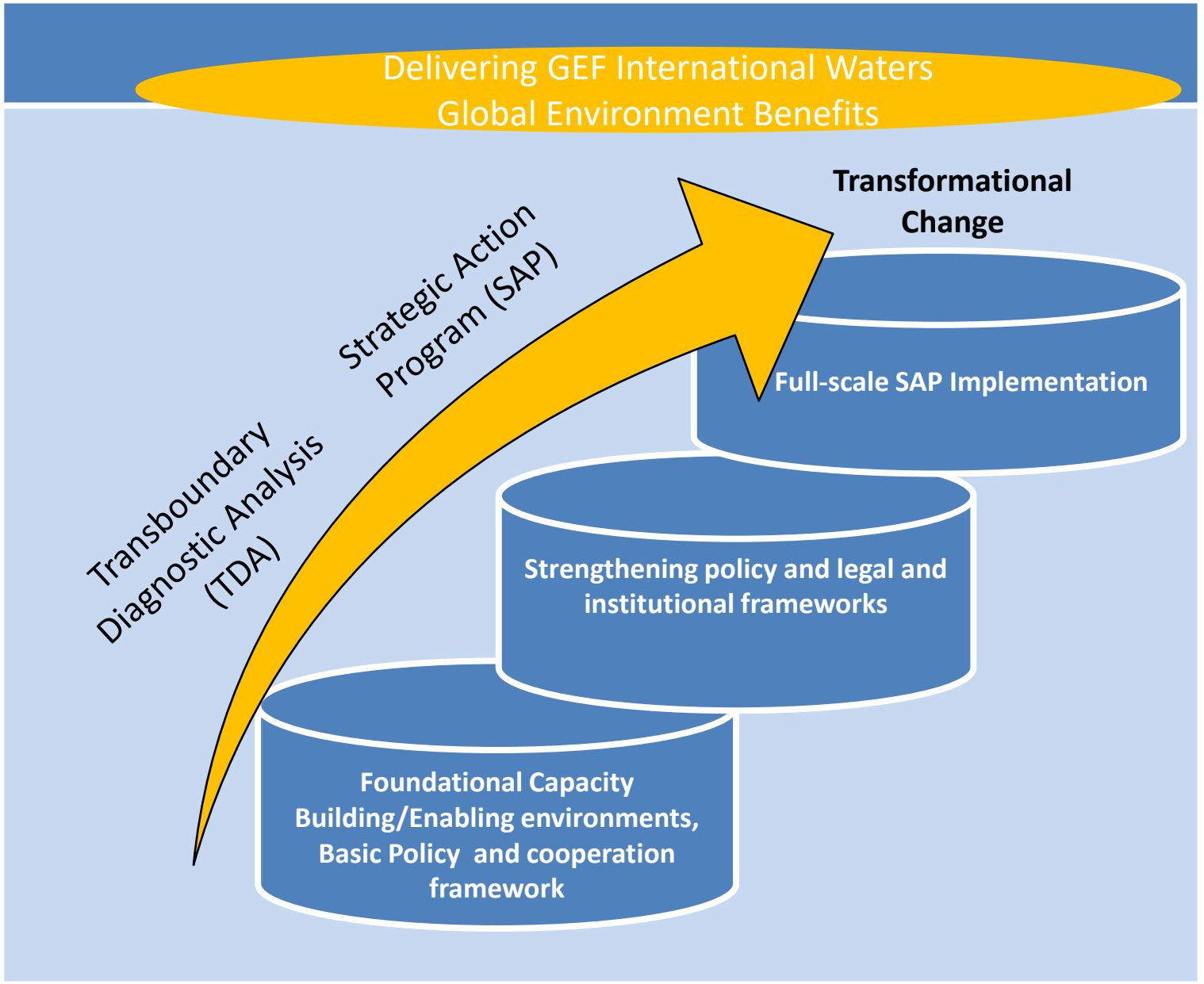
LD 3: Integrated Landscapes

Objective 1: Promote innovation & technology transfer

Focal Area Objectives

- The solutions should deliver results that align with GEF-6 focal area objectives

GEF IW investment modality



GEF-6 IW Strategy

Goal: To promote collective management of transboundary water systems and implementation of the full range of policy, legal and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services

Objective 1: Catalyze Sustainable Management of Transboundary Waters

1. Foster Cooperation for Sustainable use of Trans-boundary Water Systems & Economic Growth

2 .Increase Resilience & Flow of Ecosystems Services in Context of Melting High Altitude Glaciers

Objective 2: Balance Competing Water-uses in the Management of Transboundary Surface and Groundwater

3. Advance Conjunctive Management of Surface & Groundwater systems

4. Water/Food/Energy/ Ecosystem Security Nexus

Objective 3: Rebuild Marine Fisheries, Restore and Protect Coastal Habitats, and Reduce Pollution of Coasts and LMEs

5. Reduce Ocean Hypoxia

6. Prevent the Loss and Degradation of Coastal Habitat

7. Foster Sustainable Fisheries

- IW Program 4, Nexus

In order to address transboundary pollution from industrial, agricultural and municipal sources, including by heavy metals from mining, tanning and/or dying industries, organic pollutants, sediments, as well as introduction of invasive species, **regionally agreed regulatory approaches**, incentive mechanisms, and innovative technologies involving both public and private sector actors are needed. Therefore, GEF is promoting integrated 'ridge-to reef' approaches, including proactive strategies and innovative investments directed at pollution reduction from different sectors to address hypoxia in lakes and coastal areas. Active stakeholders in these investments include policy makers and civil society, including private sector players such as capital providers, large corporations, SMEs, local business councils and other groups of small scale individual entrepreneurs.

- IW Program 5, Reducing Ocean Hypoxia:

Innovative policy, economic, and financial tools, public-private partnerships and demonstrations will be pursued with relevant governments and sectors towards 'closing the loop' on nutrient production and utilization and restoring nutrient balance within planetary boundaries and eliminating or substantially decreasing the extent of dead zones.

Recognizing the IW portfolio gaps identified in the GEF STAP Hypoxia report GEF will initiate collaboration through targeted research as well as with the private sector, including capital providers, large corporations, SMEs, and groups of small scale individual entrepreneurs.

Actions under GEF-6 will be closely tied to, and in instances directly combined with, support under the GEF Land Degradation Focal Area.

GEF-6 LD Strategy

Goal: To arrest or reverse land degradation (desertification and deforestation)

LD 1: Agriculture and Rangeland Systems

1. Agro-ecological Intensification – efficient use of natural capital (land, soil, water, and vegetation) in crop and livestock production systems

2. SLM in Climate-Smart Agriculture – innovative practices for increasing vegetative cover and soil organic carbon

LD 2: Forest Landscapes

3. Landscape Management and Restoration – community and livelihood-based options for increasing forest and tree cover

LD 3: Integrated Landscapes

4. Scaling-up SLM – moving appropriate interventions to scale for crop and rangeland productivity

LD 4: Institutional and Policy Frameworks

5. Mainstreaming SLM in Development – influencing institutions, policies, and governance frameworks for SLM

GEF-6 C&W Strategy

Goal: to prevent the exposure of human and the environment to harmful C&W of global importance, including POPs, mercury and ODS, through a significant reduction in the production, use, consumption and emissions/releases of those chemicals and waste

Objective 1: Develop the enabling conditions, tools and environment for the sound management of harmful chemicals and wastes

1. Develop and demonstrate new tools and economic approaches for managing harmful chemicals and waste in a sound manner

2. Support enabling activities and promote their integration into national budgets and planning processes, national and sector policies and actions and global monitoring

Objective 2: Reduce the prevalence of harmful chemicals and waste and support the implementation of clean alternative technologies/substances

3. Reduction and elimination of POPs

4. Reduction or elimination of anthropogenic emissions and releases of mercury to the environment

5. Complete the phase out of ODS in CEITs and assist Article 5 countries under the Montreal Protocol to achieve climate mitigation benefits

6. Support regional approaches to eliminate and reduce harmful chemicals and waste in LDCs and SIDs

GEF-6 BD Strategy

Goal: To maintain globally significant biodiversity and the ecosystem goods and services that it provides to society

BD1: Improve Sustainability of Protected Area System

1. Improving financial sustainability and effective management of national ecological infrastructure

2 . Expanding the reach of the global protected area estate.

BD 2: Reduce threats to Globally Significant Biodiversity

3. Preventing extinction of known threatened species

4. Prevention, control, and mgmt of Invasive Alien Species.

5. Implementing the Cartagena Protocol of Biosafety

BD 3: Sustainable Use of Biodiversity

6. Ridge to Reef: Maintaining integrity and function of globally significant coral reefs

7. Securing Agriculture's Future: Sustainable use of plants and animals genetic resources.

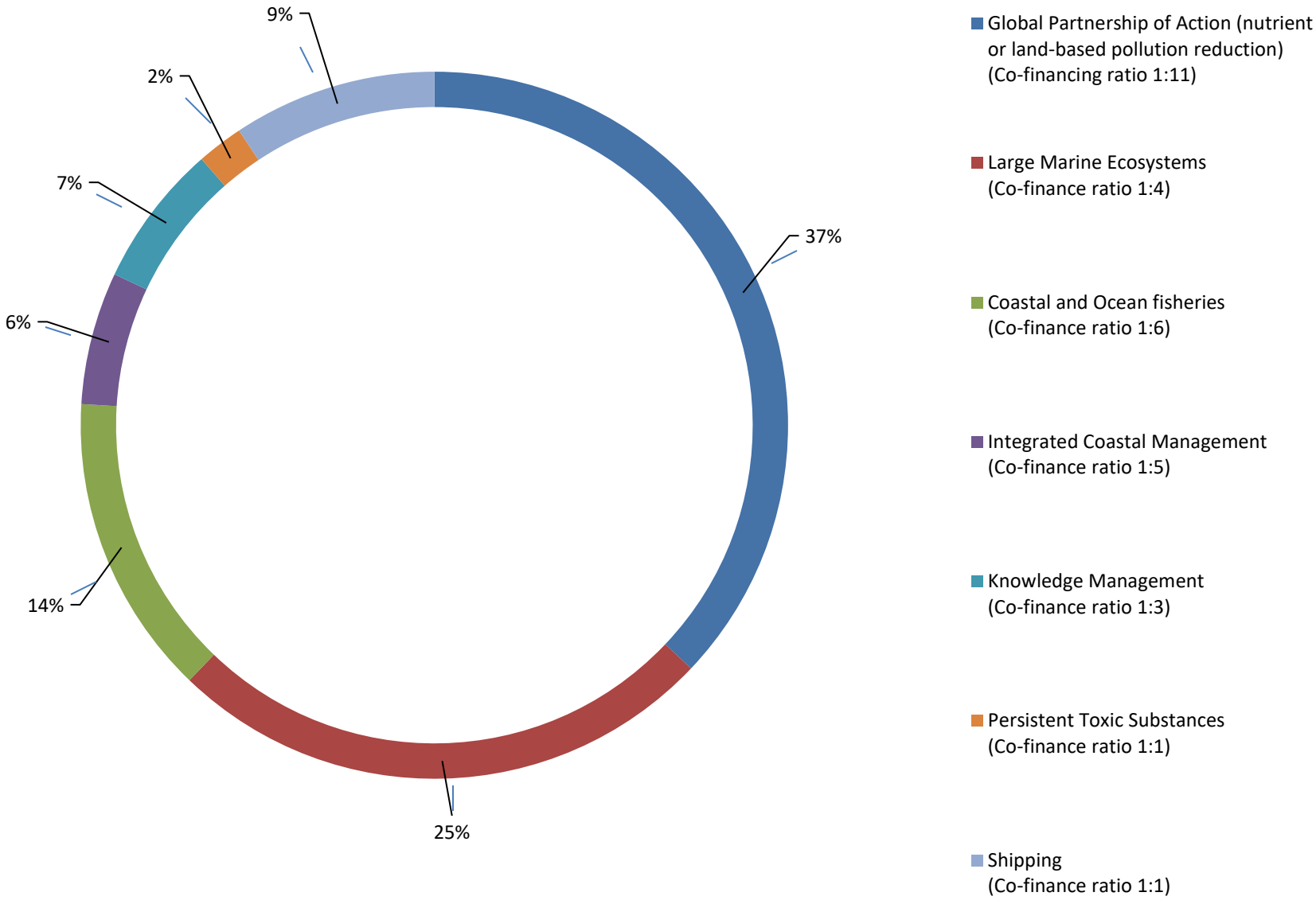
8. Implementing the Nagoya Protocol on Access and Benefit Sharing.

BD4: Mainstreaming Biodiversity Conservation and Sustainable Use in Production Landscapes/ Seascapes and Sectors

9. Managing the Human- interface: landscape/seascape approach

10. Integration of biodiversity and ecosystem services in development and financial planning

International Waters marine project grants from 1992-2014 ($1.15 Billion)



Examples of existing portfolio

WB/GEF Investment Fund for Pollution Reduction in the LMEs of East Asia

- **Tranche 1:** US$35 million
  Tranche 2: US$30 million
  Tranche 3: US$15 million

- **Total:** US$80 million

- The first phase of the Investment Fund was approved by the GEF Council in two tranches: in November 2005 (Tranche 1a; US$25 million) and in November 2007 (Tranche 1b; US$10 million).

- The IF is to co-finance projects in support of infrastructure, technical assistance, capacity building, and information dissemination and replication. All projects would be associated with other sources of funding, in particular World Bank operations (providing significant co-finance).

- Expected outcomes of the Fund would be increased investment in activities that reduce land-based pollution and the replication of cost-effective pollution reduction technologies and techniques demonstrated by the Fund.

GEF 5 related projects (with possible synergies/ opportunities)

- UNEP (UNDP)/GEF - Integrating Water, Land and Ecosystem Management in Caribbean Small Island Developing States (IWEco)
- UNIDO/GEF - Gulf of Mexico
- UNEP/GEF- African Small Island Development States

UNEP/GEF Blue Forest

WB/GEF Capturing Coral Reef and Related Ecosystem Services (CCRES)

WB cross support exercise

- Thinking out of the box

Blue Biomass

Marine nutrients: an unutilized resource

…The Danish example

Macro algae cultivation and utilization as a new instrument within the Danish water schemes

Reality

High level of conflict between farmers and policy objectives on Water Framework Directive targets.

- 9,000 (19,000) tons N per year reduction targets.

Reality

- Production of animal protein and grains is highly effective, but…
  - An annual 1400 ton/P and approx. 60.000 ton/N is **still** lost to marine ecosystems.
- **Effect on environment**: eutrophication, causing habitat loss and expansion of coastal dead zones.
- **Political reaction**: Three decades of heavy regulation of agricultural/aquacultural industries have lead to high level of conflict (nature vs. competitiveness).
- **Prevailing Danish environmental approach:** Nutrients considered a source of pollution, not an unutilized productive resource.

Green growth solutions needed: **combining economically and environmentally intelligent solutions…**

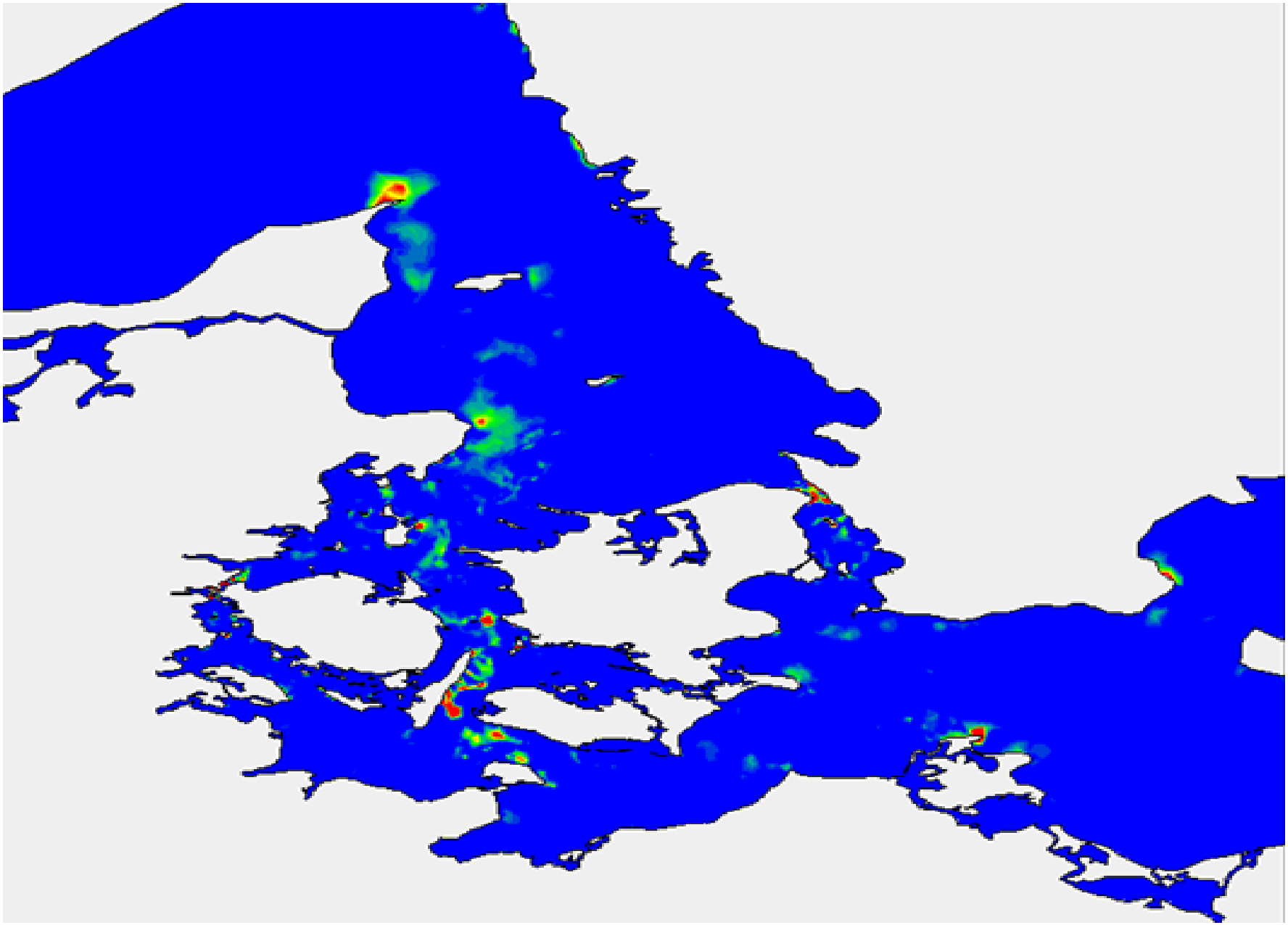
New opportunities?

Sugar kelp as a cost effective bio-filter capable of mitigating eutrophication and creating green growth synergies?

A good yield depends on selection of right cultivation areas

- Temperature
- Light
- Depth and sedimentation
- Current
- Salinity
- Nutrient flows

Upwelling within Danish inner waters



Indicative yield data

- Average wheat yield per hectare in DK = 8 tons per year.
- A two year sugar kelp production cycle produces an average of 5.26 tons (dry weight) per year, corresponding to 66 % of the yearly wheat yield.

Placing of rope seedlines	Growing periods in months	Harvest time	Yield pr m rope in kg wet weight	Yield pr long line in ton wet weight	Yield pr hectare in tons wet (W) and dry (D) weight
Sep - Nov	22 - 24	August	17.55	14.62	58.48 (29.24) W 10.53 (5.26) D

Indicative data from Seaweed Seed Supplys Danish based production

Conversion of political nitrogen reduction targets to biomass

Nitrogen reduction target	Production in wet weight	Production in dry weight	Phosphorus loss from agriculture	Biomass phosphorus fixation	Difference: phosphorus loss/capture	Required area (ha)
19,000	4,269,663	768,539	1,400	3,846	-2,446	146,021
9,000	2,022,472	364,045	1,400	1,822	-422	69,168
1,000	**224,719**	**40,449**	**1,400**	**202**	**1,198**	**7,685**

- Dry matter nitrogen content: 2.47 % (+/- 0.13) - Gevaert et al (2001).
- Dry matter phosphorus content: 0.5 % - Murata et al (2001).
- August harvest: 130 kilo N per hectare per year.

In reality commercial interests, nature conservation and recreational interests must be balanced

Production costs

Business case today (Danish production costs):

Production costs (including overheads and R & D): 77€ ton/wet weight

Breakdown:

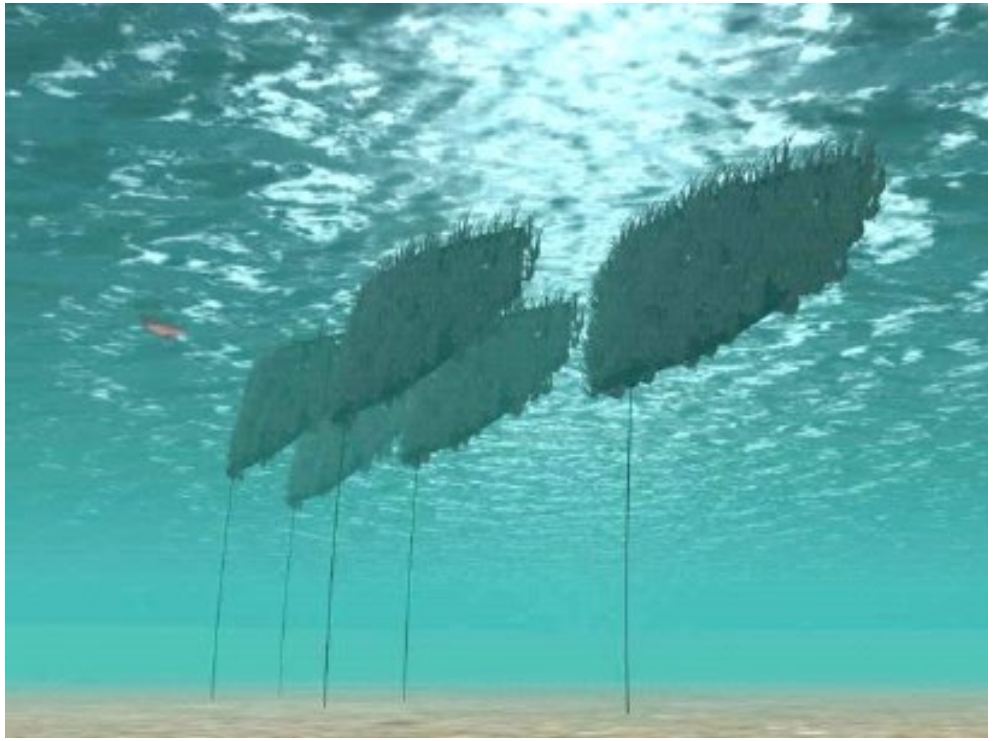
- 22,47 € hatchery
- 35,49 € growout

Revenue:

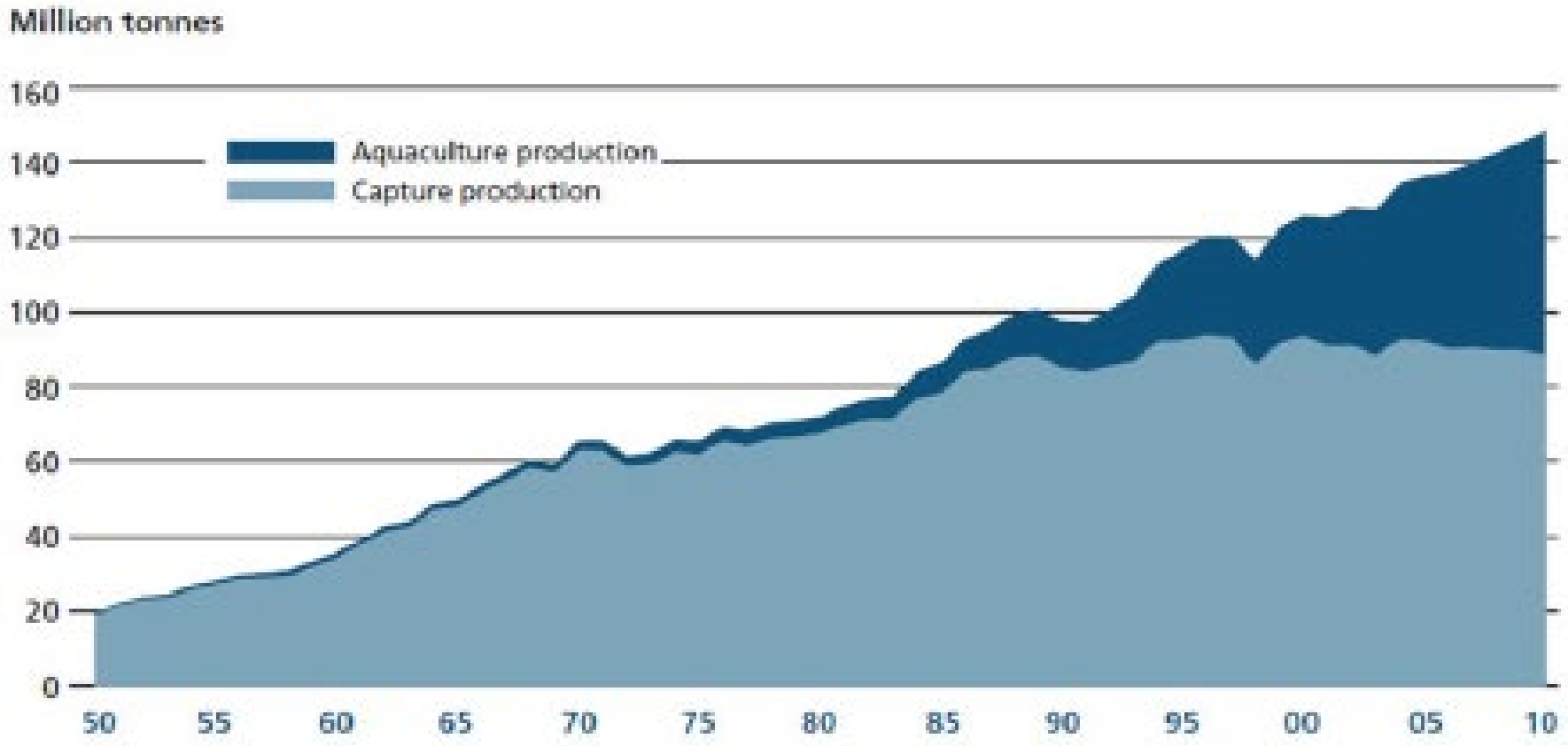
- Produce sold to pig feed producer: 100 €/ton wet weight.
- Additional revenue of approw. 40€/ton wet weight achieved throug N-kvotas to fish producers.

The future?

Concepts suited for implementation in high seas areas are under development and expected to reduce production costs to below 30 €/ton.



Global aquaculture production of fish for consumption has 12-dobled over last three decades (1980-2010)



The state of World Fisheries, FAO, 2012.

May 2003: 640 USD per MT
May 2013: 1835 USD per MT

Peru Fish meal/pellets 65% protein, CIF, US Dollars per Metric Ton
http://www.indexmundi.com

Key trial results

Use of non fermented Sugar Kelp meal in fish pellets (5-10 % blend) as a substitute for fishmeal:

The kelp seaweed protein level is lower (approx. 10-15 %) than the standard protein requirement for fish, however:

- The seaweed inclusion doesn´t compromise with growth performance, while feed intake is similar to standard feed.
- Reason: most likely due to better digestion of the overall protein material.

Effect:

- Increased digestiability leads to a reduction in overall protein content by 14% compared to conventional feed.
- When calculating both fish intake/deposition of protein the overall nutrient loss is reduced by 24% compared to conventional fish feed.
- Further, feed containing seaweed is proved to reduce salmon fish lice outbreaks and the improve coloring of fish meat when slaughtered.

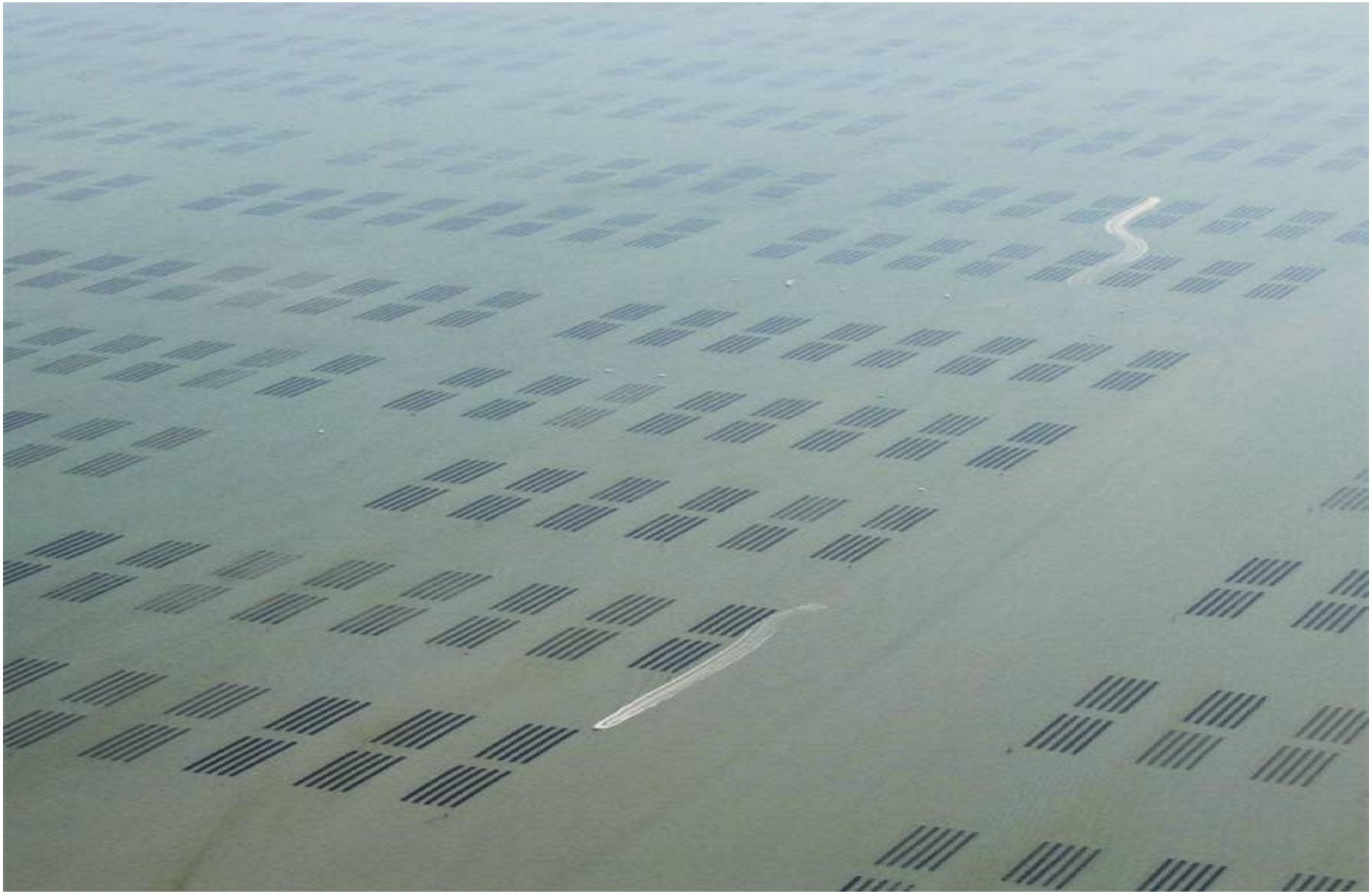
Timeline: within 12 onts a fully developed fish feed is expected to be introduced to market.

Danish fulfilment of EU reneable energy directive

Data should be verified as the different assumptions are tested on a commercial basis.

➢ **Sugar kelp biomass yield**
29.2 tons (wet weight) per ha per year
5.3 tons (dry weight) per ha per year
➢ **Bioethanol yield (laboratory scale)**
80 % conversion of carbohydrates: 0.281 l bio-ethanol per k dry weight (Wargacki et al, 2012)
1,489 l bioethanol per ha per year
➢ **EU reneable energy directive fulfillment (25 million l): biomass and areal requirements**
Biomass (dry weight): 90,000 per year
Areal requirements: 17,000 ha per year
➢ **Nutrient and CO2 fixation**
Nitrogen: 2,200 ton/year
Phosphorus: 450 ton/year
CO2: 162,000 ton/year (Bruhn et al, 2010)

Asian seaweed production



Future perception of green growth

- Mutual dependencies between healthy land and sea based production systems increases the overall value within both systems and thereby industry incentives to preserve them…

So, is it really that simple?

- **LARGE AREA AVAILABLE**
- **NO NEED FOR FRESH WATER**
- **HIGHER GROWTH RATE**
- **LOW COST BIOMASS WITH MANY APPLICATIONS**
- **NO DRAUGHTS, FROST, FLOODS, FIRE**
- **NO FOOD VS. FUEL ISSUE**
- **NO NEED FOR FERTILIZER**
- **NO NEED TO CLEAR AREAS –**

  (No Indirect Land Use Change)

- **MULTIPLE CROP ABILITY**
- **MOVABLE FARMS**
- **SCALABILITY**
- **ECONOMICS OF SCALE**
- **LOW COST LOGISTICS**
- **LOW CO_2 FOOTPRINT**
- **NO WATER POLLUTION**
- **BIOFILTER- CLEAN UP**
- **STRONG DEMAND FOR A SUSTAINABLE BIOMASS**

https://www.facebook.com/photo.php?v=10201016509194577&set=vb.118720564900442&type=2&theater

GEF IW and aquaculture

- Forms only a minor part of the GEF 6 IW strategic objectives
- There should be strong country buy-in and International Waters investments should form part of the TDA/SAP approach
- Focus on innovation and optimal resource use within multi-tropic systems