

Summaries
of the
Monaco Blue
Initiative 2016
7th edition
São Paulo

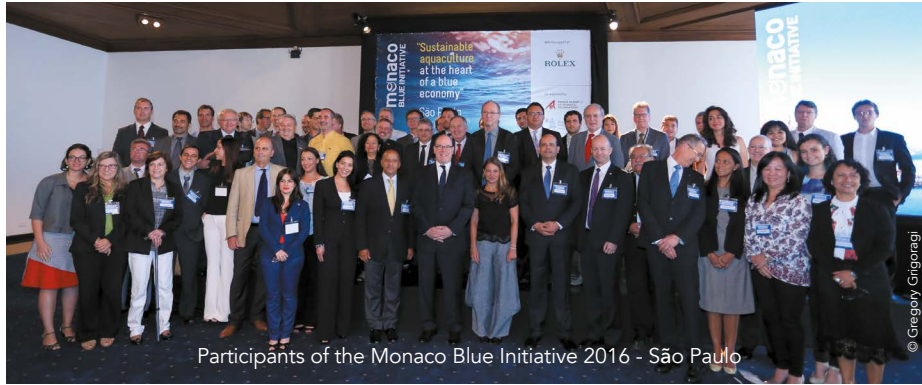
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Participants of the Monaco Blue Initiative 2016 - São Paulo

The Monaco Blue Initiative is a platform for discussion co-organized by the Oceanographic Institute, Foundation Albert I, Prince of Monaco and the Prince Albert II of Monaco Foundation, presided over by H.S.H. Prince Albert II of Monaco. Its members meet annually to discuss the most current global challenges for ocean protection and preservation. It is an effective platform for communication and exchange between the different sectors of activity and stakeholders concerned with the utilization of the ocean and its resources. The aim is to create synergies between stakeholders concerned with the protection of marine ecosystems and socio-economic development.

EDITION 2016 SUSTAINABLE AQUACULTURE AT THE HEART OF A BLUE ECONOMY”

World fisheries are in decline. Aquaculture on the other hand is continuing its leap forward in order to address an increasing demand in seafood products, over half the production of which it now provides.

Although aquaculture achieves high energy yields compared to landbased farming, if poorly managed its growth is likely to lead to environmental damages. Their cost may be substantial, particularly in biodiversity hot spots such as Brazil and Latin America. In order to be sustainable and find its place within the Blue Economy, aquaculture needs to transform itself successfully, curb its excesses and adopt a broader view. Covering the increasing nutrient and protein requirements of a growing population whilst reducing the environmental impacts, finding its place along the coastline and ensuring economic viability are not the only objectives. The services it can provide and the benefits it can generate extend well beyond this.

Aquaculture can contribute towards the sequestration of carbon released into the atmosphere thanks to cultivated algae and can combat ocean acidification with integrated multitrophic aquaculture (IMTA) which furthermore traps and recycles nitrogenous pollutants. Aquaculture can be an ally in the conservation and preservation of biodiversity, through integration into marine protected areas and other biodiversity hot spots. Optimising relationships between aquaculture, agriculture, farming and fishing with a view to a circular economy and developing co-products via high value added sectors offer fantastic opportunities. Decisionmakers, public authorities and research have a key role to

play. Consumers, more demanding in terms of quality and traceability, are also major drivers of the transformation. To meet these challenges, aquaculture needs to place itself at the heart of an economic model, where production activities are no longer in conflict with the environment but protect it. It is now necessary more than ever before to implement bold cross solutions in order to prevent the pitfalls of the landbased models and consolidate the challenges of food security, climate and biodiversity.

When exploring the impacts of climate change on oceans, and their role in climate change mitigation, the oceans' role in climate-change response - as or more important than that of forests, from temperature regulation to carbon sequestration - is clearly underlined; as is the lack of knowledge about precise mechanisms and measures. The oceans themselves are threatened by climate change, a very serious issue for biodiversity, livelihoods and other ecosystem services. For that reason, climate change issues must be clearly integrated into Marine Protected Areas design and management, and in management of MPA networks, for greater coherence and efficiency. Concerning the high seas, the interest to create MPAs mustn't obscure the need to responsibly manage the whole ocean. As highlighted during the last session of the day, the current BBNJ negotiations will be one crucial tool in this process, as are the Sustainable Development Goals that pertain to the conservation and sustainable use of oceans, seas and marine resources, and represents the first time the ocean community has managed to place oceans in the larger development picture alongside goals regarding poverty, hunger, education and health.

SESSION 1

Sustainable aquaculture in South America: trends and challenges

Moderator:

Doris Soto (Aquaculture-environmental interactions expert, former FAO Senior Aquaculture Officer)

Panelists:

Wagner Valenti (Professor, Sao Paulo University); **Felipe Matias** (Executive Secretary Aquaculture Network of Americas; Executive Director of Aquabras/Felipe Matias Associated Consultants); **Guilherme Dutra** (Conservation International); **Antonio Garza de Yta** (World Aquaculture Society)



Aquaculture, the fastest-growing food sector worldwide, is dominated by Asia, Doris Soto said. Asian aquaculture's growth is reaching its limits because of land, water and climate-change issues. This represents a huge opportunity for Latin America, which currently accounts for just 3.5% of global aquaculture, but also a challenge. We don't want to repeat past mistakes - we want to do this well, which presents complex environmental and social challenges.

According to **Felipe Matias**, the aquaculture industry - the biggest agrobusiness in the world, worth some \$600 billion - was an important tool in the fight against hunger. Brazil's rapid development has lifted many people out of poverty. As a result, they are consuming more goods and services, food and fish among them. Brazil's 2003 creation of a secretariat and then ministry of aquaculture and fisheries gave new impetus to the debate on fish production and spurred private sector interest. Licensing, however, is an issue:

in Brazil the frontier of development in aquaculture is not land, water or any other production variable - it is environmental protection. There is a need for greater flexibility in licensing, while not forgetting environmental concerns. Progress can be made - 10 years ago, the northern Amazon region did not produce farmed fish; now it is the biggest producer in the country. New measures must be implemented to ensure aquaculture is sustainable. In Brazil, this means producing a lot more fish using a lot less water. Technology - including biotech solutions - exists to achieve this. The challenge lies in getting producers to change systems already in place. Sustainability must produce social insertion, environmental responsibility and economic development. If any one of these elements becomes more important than the other two, there will be no sustainability. In 2030 there will be 9 billion people on Earth, of which 1 billion will still be hungry. This will not be remedied with fish or shrimp, but with microalgae.



Wagner Valenti pointed out a paradox: society today refuses to control demographic growth, yet the natural resources to feed and provide services to these people are finite. Aquaculture is a very good tool for feeding populations and providing quality of life while conserving natural resources. Current aquaculture systems can be changed to systems that entrap nitrogen, carbon or other matter while providing ecosystem services such as foods, social development and environmental conservation. Brazilian aquaculture is growing 8-10% annually, representing about 600,000 tons of fish, mollusks and plants. While this is nothing compared to Asia, it is huge compared to 10-20 years ago. However, it is not clear whether this is economically sustainable. The Brazilian focus on exotic species is a big problem for the environment. It will take scientific research and investment in technology to find replacements and to grow native species. But these have problems too: Hybrids enter the natural sphere and mate with others, creating problems with the genetic pool. There is also a risk from microorganisms produced while farming these species. They enter the environment through effluents and we don't know what the impact is. Many examples in Brazil show that we can produce profitably in an environmentally friendly way. The first integrated multi-trophic aquaculture farm in NE Brazil, which produces shrimp, algae, oysters, fish and marine seahorses without using any commercial feed, is very profitable. In the south, the polyculture of carp is another successful example. Brazil has huge potential, calling its ocean "another Amazon." The country's coastal exclusive economic zone is equivalent to 50% of Brazilian territory. The South Atlantic's upwelling waters there carry a lot of nutrients to the surface, and offshore aquaculture production could take advantage of that.

For aquaculture to be a sustainable source of protein, it must complement and not compete with fisheries, which is not always

the case today, Guilherme Dutra said. Most of Brazil's many aquaculture systems are not sustainable. We must look at the few which are, such as Professor Valenti's examples, as well as shrimp farms in closed systems and mussel-farming now being developed in the south of Brazil. Several Amazon species being developed for freshwater aquaculture are promising, but more research is needed to develop techniques and incentives for producers to adopt these in a more sustainable way. We need market mechanisms to give incentives to those who are doing the right things. Conservation International is working on one such mechanism with many partners, following the MSC and ASC protocol, as well as other certification programs. The More Sustainable Fisheries project will pay more to responsible small-scale fisheries. In the next phase, the project will be extended to aquaculture.

Addressing aquaculture's environmental footprint compared to other food sectors, **Antonio Garza** noted that fish make more efficient use of energy than any terrestrial animal: catfish grow 0.85 grams per gram of food consumed, compared to beef, which only grows 0.13 grams per gram (chicken, the most efficient land animal, grows just 0.5 grams per gram). A recent study at Garza's university showed that even a small improvement in food conversion ratios could produce huge savings for producers and significant reductions in energy, land, water and wild fish consumption. And while much fish farming is done in freshwater, a precious and scarce resource, aquaculture uses relatively little of it and will use even less in the future. It will move away from today's large ponds, which have a lot of evaporation and seepage, towards more intensive culture. Freshwater aquaculture's potential for integration with agriculture is very promising, offering multiple uses for water. In marine environments, however, fish farming's footprint is not just water but also animal waste, fertilizer, pesticides, sediment inputs, hormones and antibiotics. Eco-labels pay close attention

to this. There is a need for management plans that integrate aquaculture with fisheries. But the main challenge is to improve the livelihoods of the people involved: Aquaculture needs the best environment to produce the best product – but what we really need is to create well-paid jobs.

Patricia Iglesias, São Paulo state secretary for the environment, recognized that environmental licensing remains an obstacle. The government is working to make licensing more efficient. Research is needed to better analyze aquaculture's ecological footprint compared to other fields of production.

Simone Jones, the Brazil liaison for Seafood Watch, predicted that in the next 30-40 years Brazilian aquaculture would probably be producing a lot more than Asia. How can we promote sustainable growth and avoid reproducing issues we have in Asia right now, including human slavery?

Silvio Romero Coelho, SRC&C Consultancy General Manager Brazil, commented that aquaculture sustainability will be based on 4 major pillars: food safety, environmental issues, social issues and traceability. This requires major efforts in education and training, and in financing, and perhaps the Monaco Blue initiative could help with that.

Rafaela Dias Pires, Brazil's secretariat of ports urged participants to think about other peoples, such as traditional fishing communities of the Amazon, when thinking about aquaculture. We have to work with social responsibility, thinking about replenishing species and respecting the environment.

Wagner Vilegas, chemist at the UNESP-Bioscience Institute, contributed a different perspective: while we mostly talk about aquaculture as food, Vilegas sees it as a chemical and pharmaceutical laboratory offering the possibility of new

medicines to treat chronic disease in an aging population.

Felipe Matias agreed as to aquaculture's pharmacological potential, noting that it produces many microorganisms such as microalgae that can be used to treat Alzheimer's and other diseases. "I am convinced microalgae will feed the hunger of the world; there is no doubt that aquaculture can be productive in many other areas". Mr. Matias was less optimistic about aquaculture's economic sustainability, noting that most other types of agricultural production are not sustainable either, and need to be subsidized. Taking full advantage of high-value byproducts produced alongside the target organism, as in a circular economy, would improve aquaculture's viability. Other lower-value but important byproducts include protein hydrolysate, chitosan, chitin and calcium - rather than rejecting them into the soil or water as pollution, could also be a promising source of revenue. Mindsets need to change, particularly concerning feed - producing agricultural products like vegetables, soy and corn to feed fish before humans is totally unsustainable. Technological solutions exist: non-fed or IMTA aquaculture systems, where waste feeds other species. Urban aquaculture or aquapony is another solution for producing fish and certain vegetables in a very small space. Improving feed conversion rates is not a panacea, and requires a lot of money for research. Research on nutrition should be conducted side by side with genetic research, as feed for one species may not be suitable for another. Intensively fed monoculture is not sustainable and that feed conversion figures are deceptive. Finally, if you use good technology but don't take peoples' future into account, you fail. It is very, very important to look at social, economic and environmental processes.

Wagner Valenti noted that while Brazil engages in a lot of research, most

continues to focus on traditional topics such as FCR, productivity or feed ingredient. But the younger generation is working in a more integrated way to look for improved profit, lower environmental impact and increased social benefits.

Regarding the relationship between aquaculture and fishing, **Guilherme Dutra** said the challenges are very similar: "We have to produce more, and we have to produce better." The cost of changing the production model, conducting outreach and creating incentives to produce in a more responsible way will have to be subsidized by the government or by foundations. Organic agriculture in Brazil offers a model: it is growing 20-30 percent a year, and many family producers are migrating to this kind of agriculture. Government incentives help during the transition and initial costs decline as production reaches economies of scale.

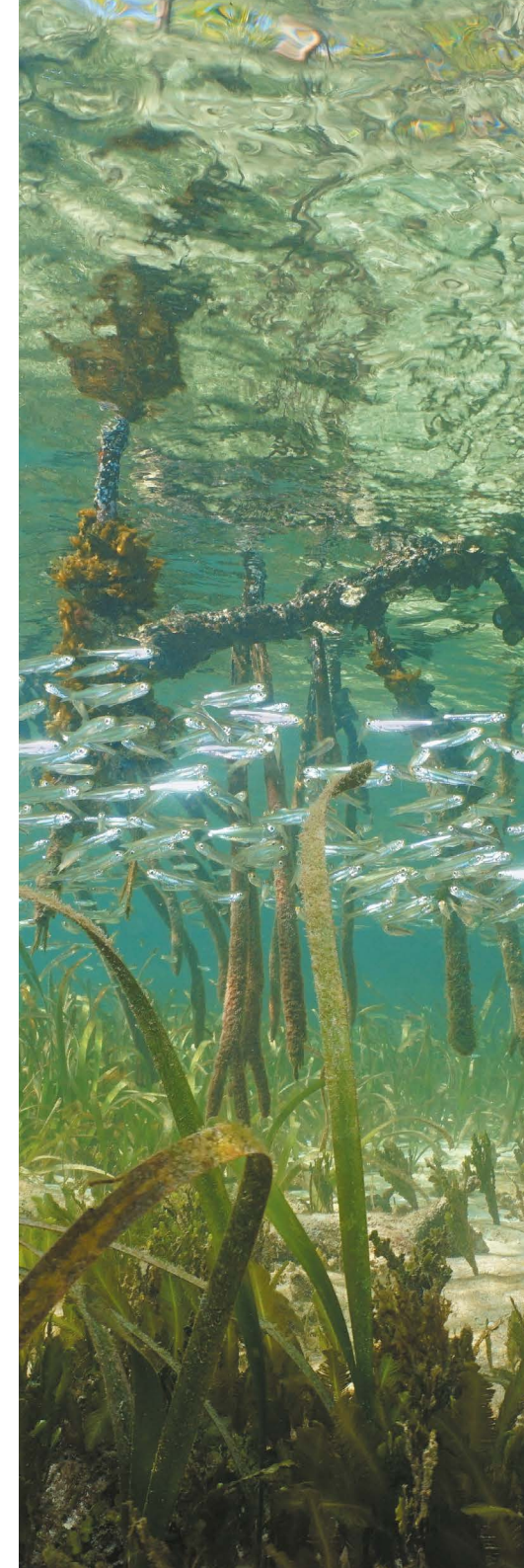
Felipe Matias emphasized the need for help with effective monitoring. Latin America also needs help setting up pilot projects using existing technologies that private producers don't want to or cannot afford to invest in.

Silvio Romero Coelho stressed the need for outreach and capacity building. "We can't just let people try to learn aquaculture by themselves and waste years trying to learn something we already have the technology for". In his view, the future is algae, which will not only sequester carbon, but also provide the protein that fish, seafood and livestock need, as well as medicines. As for integrating artisanal fishermen into aquaculture, Romero Coelho said he had tried and failed many times. "A fisherman is a hunter, not a farmer". What has succeeded is working with fishermen's wives on very simple, low-cost aquaculture projects. These women have ended up making more money than the men, becoming empowered in the process. MBI could be an aid to break out of existing paradigms and generate the necessary

political will. "We need to plant the idea that aquaculture is going to feed the world and that Latin America is the future of aquaculture, and these initiatives help" he said, thanking Prince Albert of Monaco in particular for his interest, support, and input. "If you can help us put these ideas which are absolutely necessary on the political agenda of all our countries, aquaculture will develop and we will be by far the giants in this area".

Colombian environmentalist **Sandra Bessudo** expressed concern about the use of Asian species for Latin American aquaculture, noting aggressively invasive species had already escaped and are now in the region's rivers. She called for more research into local species.

Doris Soto agreed, emphasizing the need for prior risk assessments. Summarizing the session, Soto noted panelists agreed aquaculture is a major opportunity for Latin America. It has a lower environmental footprint than many other animal production systems, while offering high-quality protein, making it a good societal choice if planned and managed sustainably. Aquaculture's development must balance economic, social and environmental objectives, which requires efforts from producers, science and governments. Licensing should be an instrument for achieving sustainability, not an obstacle, and market mechanisms should be introduced to create incentives. Research in Brazil ought to shift its focus to what farmers need for implementation and sustainability on the ground. Efforts are also needed to ensure aquaculture does not compete with fishing, especially small-scale fisheries, and to integrate the two types of production. She also highlighted consumers' role in demanding a product that is socially, environmentally and nutritionally acceptable. Finally, local communities and indigenous groups must not be overlooked. Numerous small pilot projects show aquaculture can offer them social benefits such as better food, income and development opportunities.



SESSION 2

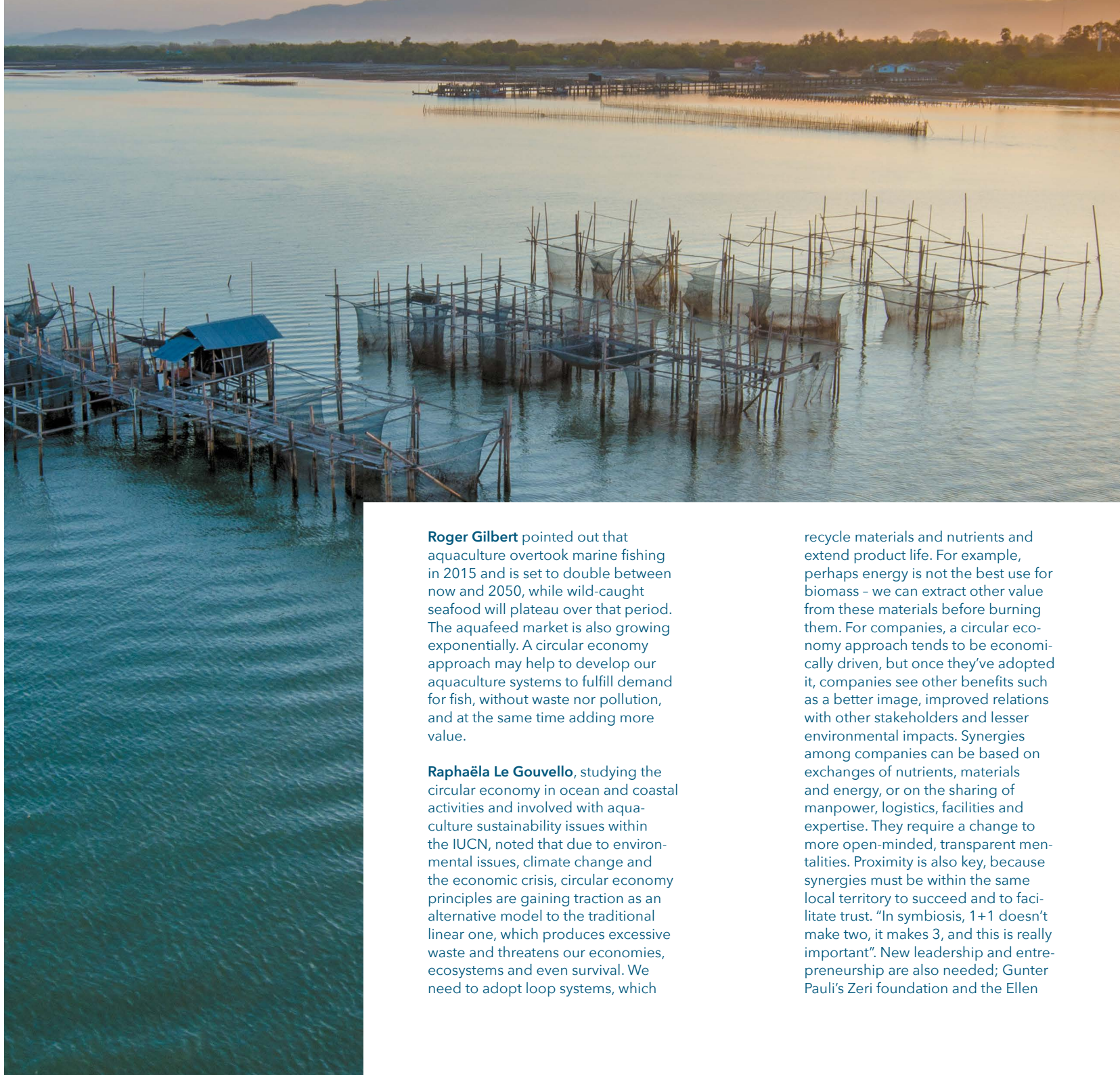
No waste, no pollution, more value: aquaculture in the circular economy

Moderator:

Roger Gilbert (CEO & Publisher, Perendale Publishers Ltd./ International Aquafeed Magazine)

Panelists:

Jean-Pascal Bergé (Scientific Director, Idmer, France); **Thierry Chopin** (Scientific Director, Canadian Integrated MultiTrophic Aquaculture Network (CIMTAN)); **Raphaëla Le Gouvello** (AMURE Marine economy laboratory, University of Brittany, France); **Janaina Mitsue Kimpara**, (Researcher in Aquaculture Production Systems and Technical Coordinator, EMBRAPA, Brazil)



Roger Gilbert pointed out that aquaculture overtook marine fishing in 2015 and is set to double between now and 2050, while wild-caught seafood will plateau over that period. The aquafeed market is also growing exponentially. A circular economy approach may help to develop our aquaculture systems to fulfill demand for fish, without waste nor pollution, and at the same time adding more value.

Raphaëla Le Gouvello, studying the circular economy in ocean and coastal activities and involved with aquaculture sustainability issues within the IUCN, noted that due to environmental issues, climate change and the economic crisis, circular economy principles are gaining traction as an alternative model to the traditional linear one, which produces excessive waste and threatens our economies, ecosystems and even survival. We need to adopt loop systems, which

recycle materials and nutrients and extend product life. For example, perhaps energy is not the best use for biomass - we can extract other value from these materials before burning them. For companies, a circular economy approach tends to be economically driven, but once they've adopted it, companies see other benefits such as a better image, improved relations with other stakeholders and lesser environmental impacts. Synergies among companies can be based on exchanges of nutrients, materials and energy, or on the sharing of manpower, logistics, facilities and expertise. They require a change to more open-minded, transparent mentalities. Proximity is also key, because synergies must be within the same local territory to succeed and to facilitate trust. "In symbiosis, 1+1 doesn't make two, it makes 3, and this is really important". New leadership and entrepreneurship are also needed; Gunter Pauli's Zeri foundation and the Ellen

MacArthur Foundation are great examples. The public sector could also help by providing appropriate tools and support measures including laws and regulations, taxes, subsidies, land allocation, permits, and of course education and training. China is a leader in the circular economy, alongside Japan, New Zealand, and Australia. The 30-year-old Kalundborg Eco-Industrial Park in Denmark is one example that demonstrates the longevity of the circular economy concept. Some projects exist in Brazil and Argentina. Most have been located near big cities in very industrial areas, but projects are now emerging in more rural areas. The collaborative and social economy has a role to play, too. In Brittany, a small nonprofit organization collects oyster shells for transformation into other materials, creating jobs. A program for sustainable fish feeds began by mapping a territory's land- and sea-based activities that produce potentially usable byproducts to create a semi-loop system for production of aquafeeds. Within the circular economy, aquaculture has to open its own sector to other sea- and land-based activities, and explore all kinds of potential new types of synergies, including renewable marine energies, multiple use platforms, fisheries and tourism.

Jean-Pascal Bergé, involved in sustainable processes for converting marine resources into products for 25 years, using biorefinery, circular economy and industrial ecology principles, noted that the fish and seafood industry produces a great deal of byproduct which isn't used, despite great potential as components for food or feed. At least 40 percent of total caught or farmed seafood consists of these residues. The seafood sector is 20 years behind others such as dairy or soy. Promising strategies include composting, silage for fertilizer or feed purposes, and fishmeal for feed. However, because people handling them undervalue residues, they are not treated effectively. Even the higher value of other uses for residues is not enough to convince industries to change their practices; fish meal from byproducts

is lower in protein than meal from muscle, for instance, so the added value isn't there. Scale is also a problem - a fish-meal processing unit using residue needs to collect at least 50 tons of raw material a day to be economically viable, which requires huge and costly logistics. This means strategies are not optimized, and a lot of wastage still exists. A possible strategy to maximize uses of these residues must be outlined: first, map residues by territory to quantify and qualify what kinds of wastes are available from fish, aquaculture and agriculture, and also food waste, of which developed countries have a lot. Next, map the territory's needs in terms of fertilizers, feed ingredients, energy, and so on. The last step is to combine these maps to match local needs with resources. This can create a local, win-win, collaborative system in which residues from one become the raw materials for the other. A pilot is underway in the Vendée region in France. Success for such systems requires the support of users and producers of residues, and of pro-active politicians and regulators. Often, the latter tend to put up barriers that block innovation instead of fostering it. In conclusion, there is a need to shed the monoproduit mentality (meat with meat; fish with fish, based on big centralized units) and develop small, decentralized units able to manage different products from fisheries, aquaculture and agro-industries to create a local circular system with a biorefinery strategy.

Thierry Chopin spoke next about his activities in Integrated Multi-Trophic Aquaculture systems, or IMTA. The practice combines fed aquaculture species (like finfish and shrimp) with inorganic extractive species such as seaweed and organic extractive species like shellfish and herbivorous fish to create a balanced ecosystem approach to aquaculture. The byproducts of one crop are converted into fertilizer, food and energy for the other crops, which can in turn be sold. The key to IMTA is "doing something with everything!". In this way, all the cultivation components have both an economic value



and a key role in ecosystem services and recycling processes, as the harvesting of the different types of crops helps export nutrients out of the coastal ecosystem. IMTA's benefits include environmental sustainability (biomitigation), economic stability (product diversification and risk reduction) and societal acceptability (better management practices). "We have to change our business models from the old linear approach - one species, one process, one product - to the integrated, sequential, biorefinery approach: one species, several processes, several products". We can use seaweeds for human consumption, for cosmetics, for partial fishmeal substitution, and even for beer. Chopin is currently working with the MSC/ASC on new seaweed certification standards, and also on using seaweed as an aquaponic substratum. Today, extractive species provide ecosystem services free of charge. If you calculate how much they absorb in nitrogen, phosphorus and carbon, and compare that with a water treatment facility, seafood worldwide is providing between \$900m and \$2.5 bn in ecosystem services for free. "It's about time we put these things in a business model and on our spreadsheets". IMTA also requires a more flexible regulatory approach integrating the interactions between species, as opposed to today's monospecies approach. "We need a greener blue revolution - a turquoise revolution; We need to talk about aquanomy on water the same way we talk about agronomy on land." And lastly, aquaculture should pursue diversification to help mitigate risks due to climate change.

EMBRAPA researcher and technical coordinator **Janaina Mitsue Kimpara** shared her experience in the poverty-stricken and malnourished North East Brazilian state of Piauí, where her team designed an integrated system for food production and security. The goal of these so-called "Little Systems" was to enable a four-person family to use fish farming to achieve the World Health Organization-recommended fish consumption of 12 kg per person, per year. For a cost of \$120,

each family built a 2x4 meter fish tank using recycled materials. Their production of fish was integrated with worm, poultry, guinea pig and diversified vegetable farming. The system fit in a 500m² yard, appropriate for rural or peri-urban areas. The impact on public health was very rapid, with participating families achieving food security within 6 months. Now countries as far off as Ghana and Uganda were replicating the design, and many others were asking for their help. Public authorities played a big role; the government of neighboring state Maranhão backs this system through public policy as the most important activity for raising its human development index. These mini-systems have excellent scale-up potential; since becoming public policy in Maranhão, 1,000 are now operating, with a significant impact on the value chain. The private sector helps in supplying inputs and coordinating market insertion of these products and with technical support. Start-ups are now appearing which are more rapid-response than conventional corporations. Environmental benefits of the "little systems" are significant: the reuse of nutrients like phosphorus and potassium means you're not using fertilizer, and you're reusing more than 30 tons of nitrogen per year, and because production is both small-scale and local, chemical pest control isn't necessary, which reduces pollution. Water use, too, is sustainable, as the systems use stored water from fish farming. Kimpara's team is now exploring renewable energy to increase sustainability, using carbon sequestration in water and then using this carbon to produce microalgae or biogas energy. They are also reducing fishmeal and soy meal inputs by producing mosquito larvae for feed. Traditional fishing and indigenous communities formerly based on extractive economic activities are now adopting these systems, contributing to ecosystem and biodiversity conservation.

Frederico Brandini of the São Paulo state oceanographic institute expressed regret that while fishing receives a lot of scientific support to guide management, that is not true for aquaculture, particularly with regard to sustainability. Research is focused on

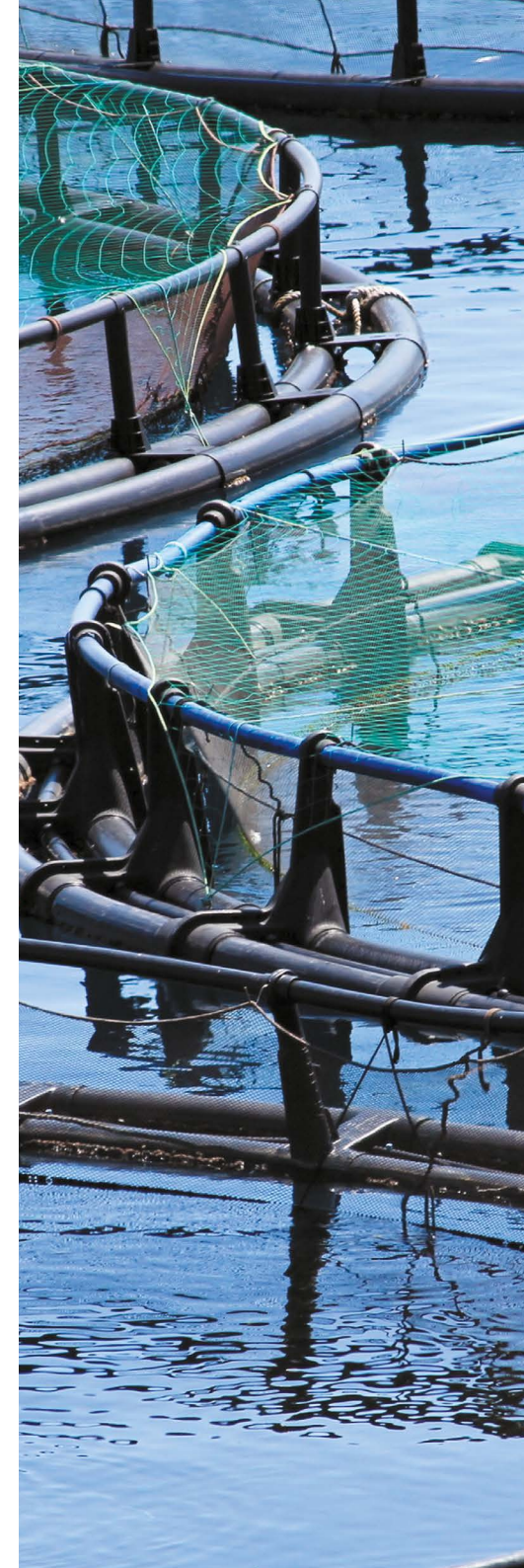
producing more cheaply, he noted.

Kimpara agreed that processes needed to be updated and based on the circular economy. One problem is that sustainability remains a vague concept; "we've been working to quantify it, because we need to define and measure it before we can create public policies around it".

Raphaëla le Gouvello agreed. For the circular economy to work, first you have to demonstrate that it's economically feasible. This doesn't always require public subsidies - demonstrating that you can create new income for small communities can be enough. In Africa, Gunter Pauli developed a whole economy around coffee by demonstrating many different uses for the 98 percent of the plant that was usually discarded, and also the use of coffee grounds. Women grow mushrooms on, that they then sell at the market.

Silvio Romero Coelho, SRC&C Consultancy General Manager tempered that optimism by pointing out the resistance to change in a business that already has a successful model. "It's difficult to get anyone to tinker with that value chain - they have financial and other commitments". It is necessary to create a protected environment for this experimental approach, and public policies can help. He gave the example of Brazil's using sugar cane to make alcohol to use as biofuel: "That was a heavily top-down, country-level decision that had to be subsidized for many years. Otherwise no manager would have done it".

Jean-Pascal Bergé noted that regulators are also very suspicious of innovation, especially in a context of macroeconomic problems, and advocated gathering everyone around the same table - industry, regulators, politicians and scientists - to try to understand each other. Summing up the circular economy session: "Considering wastes as resources solves the problem of wastes and preserve the resources."



SESSION 3

Engaging consumers and stakeholders towards sustainability

Moderator:

Roy Palmer (Executive Director, Association of International Seafood Professionals)

Panelists:

Laurent Viguié (Latin American Manager ASC); **Alessandra Weyandt** (INMETRO); **Cintia Miyaji** (Unimonte University Alliance Program/Seafood Watch); **Werner Jost** (Director, CAMANOR); **Itamar Rocha** (ABCC Associação Brasileira de Criadores de Camarão)



Brazil's current seafood consumption is just half of the world average, but is growing rapidly, in large part thanks to aquaculture (tilapia in particular), **Roy Palmer** said. This represents a golden opportunity: if we can build aquaculture activities to reach average world consumption levels in Brazil, that's excellent business. There is a cautionary tale about the dangers of making political decisions without a sound scientific basis, which has happened twice in his hometown of Melbourne, Australia. First, in the 1990s, the government closed Melbourne's Port Phillip Bay's prosperous scallop fishery. "There was no science to back this". In March 2016, again based solely on political decisions, the bay was closed to commercial fishing, destroying 42 small businesses previously harvesting about 650 tons of fresh fish annually. These businesses ticked all the boxes of the government's Environmental Protection and Biosecurity Conserva-

tion Act, and even of organizations such as Greenpeace. Their product were sold locally, providing fresh fish for markets, retailers and restaurants. Instead, the government plans to increase recreational fishing, despite having previously viewed it as a major problem. Now Australia has to replace 650 tons of fish for the local market. "It clearly won't come from Australia". "For a country with the world's 3rd largest exclusive economic zone of water to rely on seafood imports to the tune of 75 percent is poor management in my book." We must applaud what he called a massive change in attitudes at this edition of MBI compared to the first ones, where "there was not this positivity about aquaculture. This is very good".

Since 2012 the ASC has certified about 2,000 farms and nearly 5,000 products through farm certification and a traceability standard, said **Laurent Viguié**, former corporate

lawyer and cod farmer, now the Latin American Manager for the Aquaculture Stewardship Council and representing the Marine Stewardship Council in Brazil. While aquaculture certification is strong in Europe, Latin American buy-in depends on where you are. It is strong in Chile, and there are programs in Mexico, Ecuador, Peru, Columbia and Panama. For the Rio 2016 Olympics, the State of Rio de Janeiro agreed to put as many fish farms as they could under the ASC program (tilapia, trout and bivalves). In the north of Brazil, the ASC counts some shrimp farms, and Brazil's biggest tilapia producer is about to be certified; bivalve farms in the south are also engaged in this process. Vigiúe has worked extensively with WWF Brazil to create an ambitious fisheries and aquaculture policy, to be unveiled this year. "In terms of outreach we'll have the support of a very large NGO, which we're hoping will make a difference on the ground". The next major ASC standard will be the feed standard, but what constitutes sustainable feed? Not feed caught from an MSC-certified fishery; there's not enough of it to go around. For now, the feed standard is a process, as with quality of feed. Farmed fish require much less than wild fish: wild salmon eat 10 times their body weight; farmed fish about 2.1 times. Feeding animal protein to fish, which created mad cow disease, is a huge consumer issue, as is genetically modified feed. "We've got to stop. Everybody in this room knows it. Sustainability in aquaculture is a myth at the moment. We can only call our industry sustainable - and nobody at the ASC does (we call it a best-practice standard) - once we have solved the feed question."

Alessandra Weyandt (Brazilian Certification Program for Aquaculture at InMetro, National Institute for Metrology, Quality and Technology)

pointed out that InMetro's program conducted extensive field research before outlining goals for aquaculture's sustainable development in Brazil. It partnered small local producers with established industry leaders to develop new best practices and policies, which evolved into a collaborative initiative including government leaders. Aquaculture can help preserve species, promote economic growth and provide high-quality food, but inappropriate practices have negative impacts for society, food safety and the environment. Consumers want healthy foods and to know how the fish they consume was produced, while big traders demand certified fish as a guarantee of quality and sustainability. There are many certification programs, but most exist in different countries and contexts that may not apply to Brazil. Brazil has a complex patchwork of different production systems, with small, family and big businesses. Weyandt's team visited farms throughout the country to understand their practices and evaluate how close or far they were from certification. After two years of research, in 2012, researchers, governments, producers and her committee produced the National Brazilian Standards for Aquaculture, establishing best practices for environmental protection, economic viability and food security. Fish farms that adopt this standard gain a competitive advantage for national and international trade. The InMetro standard forms the basis for a certification program to empower consumers and recognize producers who apply good practices, and to enable producers to reach more demanding markets. The next step will be to provide technical assistance to help some producers implement the standards and get certified through a pilot project.

Cintia Miyaji, biological oceanographer and teacher at UNIMONTE,





has spent the last 10 years working to improve academic resources in marine sciences in Brazil. In 2009, she and her undergrad students created the first Brazilian Seafood Guide. The impact was huge, and encouraged them to seek funders and partners to update the recommendations and expand the network to NGOs, academia and the business community to create a sustainable seafood movement reflecting local realities. Since 2014 Miyaji has worked with Seafood Watch to implement a comprehensive initiative for the sustainability of Brazilian fisheries and aquaculture. They are about to launch the Brazilian Alliance for Sustainable Seafood in Brazil (ABPS), which gathers multiple stakeholders including scientists, academics, chefs, retailers, fishery and aquaculture representatives, food service companies, funders and the government. Miyaji and participants are currently mapping alliance members' initiatives to define a plan for joint action in various areas of interest. ABPS' goals are to map and share information on fisheries and aquaculture in Brazil; educate the public about sustainable seafood consumption; stimulate social entrepreneurship; incentivize corporate buyers to seek out sustainable seafood; organize meetings and discussion; and finally, recognize and reward sustainable practices.

Werner Jost has been a pioneer in Brazilian aquaculture since 1982 with his company CAMANOR. Formerly Brazil's largest shrimp producer, Camanor was hit by white spot disease in 2011, making it impossible to continue producing in a traditional low-density way. Through trial and error, they designed a new circular model of production, called AquaScience, which won the 2015 Innovation & Leadership Award from the Global Aquaculture Alliance. AquaScience consists of high-productivity

ponds with total re-circulation of the pond water during cycles, reuse of the water from one cycle to the next, a complete recycling of all organic matter through bioflocs and specific bacteria, no use of antibiotics, and no effluent into the environment. Camanor has completed seven production cycles in the last two years using the same recycled water. This has huge benefits - using new water would take one month to prepare, interrupting cycles - and is an example of how ecology and economy can coexist. Camanor adds bioflocs and probiotics and maintains very stable parameters, important for animals from an ocean environment that varies little. While white spot is still present, we no longer lose animals to it because this stability allows them to resist the virus. AquaScience is a very high-density system, with some 400 shrimp per m², yielding 150 tons per hectare annually. They could increase that to 300 - 450 tons per hectare without changing the technology. The implications are huge, relative to the 4 million tons of shrimp farmed today worldwide: at 450 tons/hectare, by committing less than 10,000 hectares to AquaScience-style production, you could produce as much shrimp in that small area as in the whole world today. Systems like AquaScience need to show consumers how they produce and the advantages aquaculture can provide compared to land-based animal production. In Europe, "high-density" is a bad word, conjuring up cramped industrial chicken farms where animals have no space to move. "We have to explain that aquaculture is different. You can have 400 animals per square meter, but by body weight, that's only 1 percent - they have 99% left to swim around. It's a totally different concept". Secondly, our aquaculture can reprocess all the waste the animals produce, a huge advantage. We have to show consumers that this is the way to produce animal protein in the future.

Sustainable seafood should not be expensive. "If we want it to succeed we have to reach the mass market. The normal consumer buys according to price - the rest is an illusion ; if you are producing high-priced sustainable seafood for just a niche market, you leave most of the market out, and we can't call this sustainable."

Former Congressman **Itamar Rocha** is currently President of the Brazilian Shrimp Farmers Association (ABCC). His company, MCR AQUACULTURA, has built more than 100 shrimp farms in the northeast of Brazil, home to 90 percent of Brazil's producers, which are mostly small and mid-sized farms. Shrimp farming has proven to be a very feasible alternative for a new economic order in these poor rural areas; even 100 square meters is enough to make a decent living. It can also reduce migration to cities, allowing rural people to live with dignity, not with alms. Today, 50% of world shrimp consumption is farmed, and shrimp farming can be carried out with respect for environment. The main enemy of shrimp is pollution from human activities; most cities in Brazil don't have sewage treatment facilities.

In response to a question about the collapse of Colombian aquaculture, Werner Jost indicated that it had less to do with Latin American aquaculture's inherent viability and more to do with Colombian specifics at the time, which included FARC terrorism and an overvalued currency that reduced export competitiveness.

Itamar Rocha agreed, and cited the example of Ecuador, which last year sold 372,000 tons of farmed shrimp worth \$2.3 billion, in a country with just 600 km of coastline.

Regarding certification for native species, Laurent Viguié warned that

concentrating on farming native species could be a double-edged sword: "It is extremely difficult: FCR ratios are not good, and since there isn't a single pirarucu hatchery in Brazil, at the moment, we're taking eggs and juveniles out of the wild. So while in principle farming native species sounds great, in practice it's not so simple".

Audience member **Frederico Brandini** launched a discussion about mangrove swamps, which represent limitless resources as carbon and environmental reservoirs, and have a very important socioeconomic role in coastal areas. Ecuador destroyed its mangrove through shrimp farming, asking how the two could be reconciled.

Laurent Viguié agreed that the environmental impact on mangrove has been huge, all over Latin America. "Any certifying system has a large environmental component; we will look at that very carefully. I've worked on shrimp farms in the north of Brazil, and if you take away all the other standards, from the environmental impact standpoint, most of them would fail".

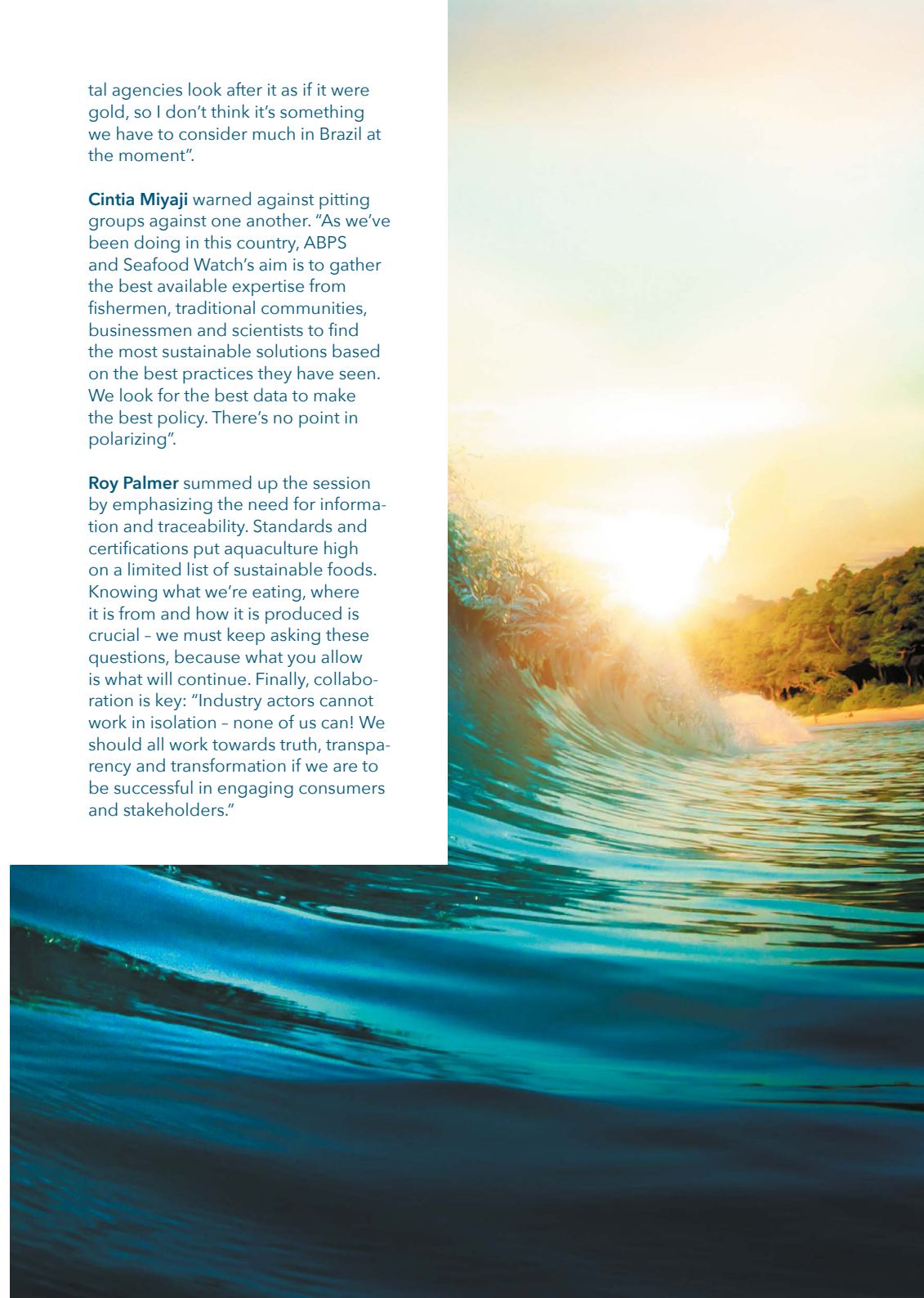
Itamar Rocha said legislation was addressing mangrove preservation by separating it from forest in the forest code, but operations in existence before the legislation was adopted would be allowed to remain. A bigger problem in his view is water quality: "We have 1 million hectares of mangrove and we don't have fisheries there because we don't look after water quality - it's been invaded by sewage. Pollution is killing everything".

Werner Jost agreed and also pointed to unsustainable fishing practices as culprits in mangrove destruction. Generally, though, "mangrove destruction has ceased because governmen-

tal agencies look after it as if it were gold, so I don't think it's something we have to consider much in Brazil at the moment".

Cintia Miyaji warned against pitting groups against one another. "As we've been doing in this country, ABPS and Seafood Watch's aim is to gather the best available expertise from fishermen, traditional communities, businessmen and scientists to find the most sustainable solutions based on the best practices they have seen. We look for the best data to make the best policy. There's no point in polarizing".

Roy Palmer summed up the session by emphasizing the need for information and traceability. Standards and certifications put aquaculture high on a limited list of sustainable foods. Knowing what we're eating, where it is from and how it is produced is crucial - we must keep asking these questions, because what you allow is what will continue. Finally, collaboration is key: "Industry actors cannot work in isolation - none of us can! We should all work towards truth, transparency and transformation if we are to be successful in engaging consumers and stakeholders."



SESSION 4

The ocean's role in climate change

Moderator:

François Simard (Deputy Head and Senior Advisor Polar and Marine Program, International Union for the Conservation of Nature)

Panelists:

Dan Laffoley (World Commission on Protected Areas & International Union for the Conservation of Nature); **Christophe Lefebvre** (European Affairs, French Marine Protected Areas Agency);

Waldemar Coutts Smart (Director of Environment and Marine Affairs, Ministry of Foreign Affairs, Chile);

Sebastian Troeng (Senior Vice President, Americas Field Division, Conservation International)



Shifting the focus away from aquaculture, this session explored the impacts of climate change on oceans, and their role in climate change mitigation. In his keynote speech, **Pascal Lamy** recalled his work as a former member of the Global Ocean Commission, which worked from 2013 to 2016 to raise awareness and promote action to restore degraded oceans to full health and productivity. Oceans are the main ecosystem for climate change mitigation due to their capacity as a source of oxygen and as a heat reservoir, carbon sink and driver of the Earth's water cycle. Yet this role is still widely underestimated. Forests have gotten a lot of political attention, but oceans are as important a reservoir for carbon sequestration as forests. Conversely, climate change has a strong impact on oceans: CO₂

leads to acidification, causing change and probably a reduction in biodiversity, and to a rise in temperature, with all the consequences we know. While last year's COP21 was a success overall, with regard to oceans, "we basically failed". Oceans are distant and largely unknown, and their interaction with climate change is complex and poorly understood. "We have a bias whereby we consider this planet as mostly about earth, and only subsidiarily about water and oceans, whereas it should be the other way around". Even so, the adoption of Sustainable Development Goal 14 is good news, as it offers a firm place in the international agenda to holistically address the ocean's importance for the planet's future. But if we want to better understand its role in climate change and better account for that

in political decisions, we need to build a bridge between science and politics. Much remains to be done on the science, and on building the necessary critical mass among stakeholders to push for political action. Regarding aquaculture and climate change, aquaculture will matter more in the future due to ocean acidification, eutrophication, and irresponsible and over-subsidized fishing. Certification, traceability and transparency will be key in this sector, whether achieved through regulation or private initiatives. "We should stress the importance of breaking down barriers, political or otherwise, among possible actors of a circular economy combining agriculture with aquaculture. There is the potential for a very powerful coalition provided we de-cluster our silos and take a holistic approach to sustainability".

Sebastian Troeng mentioned a recent scientific publication suggesting carbon emissions are now at their highest rate in the last 66 million years. This clearly causes warming; a global temperature record was broken in January this year, before being surpassed in February. "We're barreling frighteningly rapidly towards the 2-degree limit agreed upon in Paris". Some 93 percent of excess heat from climate change is absorbed by the ocean, negatively affecting many species, and especially coral reefs. While reefs make up just 0.2 percent of oceans, they host between one-quarter and one-third of all marine species. Some of the world's most vulnerable communities depend on reefs for fisheries and tourism. "Noting the recent increase in severe bleaching incidents, clearly we should be worried. If coral goes, so do many species that depend on it." Brazil is the global epicenter for nature-based solutions to climate change, thanks to the Amazon forest, but also mangrove. Mangrove forests are

climate-change mitigation machines – they suck up carbon from the atmosphere and bury it into sediments. Per hectare, mangrove stores between 5 and 50 times as much carbon as tropical forests, and the largest continuous mangrove is in northern Brazil and neighboring Guyana. Mangrove also protects against sea-level rise and storms, and Brazil's mangrove crab fishery, involving over 10,000 families, may be worth 1 billion reals (\$283 million) per year. "If we lose the mangrove we lose not just climate change mitigation but also all these other benefits". About 75 percent of remaining mangroves are protected in Brazil, and local communities are engaged in socially, economically and environmentally sustainable initiatives. Ecuador has taken a step further, establishing incentive programs whereby communities are granted concessions to use certain mangroves, receiving payments for conserving them. These initiatives and other nature-based climate solutions need to be demonstrated, supported, promoted and scaled up.

Dan Laffoley introduced the IUCN's work on carbon sequestration patterns in the ocean, currently completing a major study of warming's effects on ocean ecosystems and services. "We hear a lot about coral reefs and the Arctic, but there is a silent storm of change sweeping through the ocean, and it will affect us in many different ways". These include reducing the range of kelp forests, exposing shores, removing fish habitats and vectoring diseases. Awareness of the ocean's role as a climate change mitigator is just beginning. Mangrove is disproportionately important, but coastal ecosystems aren't the only carbon sinks, there is also "smart blue carbon:" "Take krill – is our best use of it to grind it up as a food supplement that we never previously needed?" The carbon stocked in Antarctic krill

equals the carbon in all of North America's peatlands. The highly soluble calcium carbonate that all fish secrete could be very valuable in an acidifying ocean. We must look at every possible element in our arsenal to get ahead of the curve on climate change and acidification.

According to **Christophe Lefebvre** of France's Marine Protected Areas Agency, while MPAs can't halt climate change, they can help greatly with adaptation. As Article 7 of the COP21 accord says, countries must enhance adaptive strategies, strengthen resilience and reduce vulnerability to climate change. MPAs are a nature-based solution for preserving marine ecosystems that help with climate change. In the future, we should include the climate change issue as a component of all MPA management plans, which today mainly focus on biodiversity. We must also integrate climate change and resilience into national, regional and global strategies, and MPA networks.

Waldemar Coutts, Environment and Marine Affairs Director from Chile's Ministry of Foreign Affairs, agreed that MPAs are a cost-effective instrument for harnessing the ocean's role in combating climate change. They are crucial to the recovery of ecosystems, services and fisheries. As such, MPA creation should be acknowledged as a significant national effort in the global response to climate change, particularly in developing countries. Chile has done a lot in this regard. As host of the second Our Ocean Conference in Valparaiso in October 2015, Chile announced the creation of two large MPAs. One is the largest MPA in the Americas: Nazca-Desventuradas, covering 300,000 square kilometers, with 72 percent species endemism. It also launched a process to establish an even larger MPA in Easter Island, 4,000 km from Chile's coast and

covering an area of 700,000 km². The process actively involves the local community, including consultation under ILO Convention 169 on Indigenous and Tribal Peoples. The Our Ocean Conference promotes action in areas including MPAs, Illegal Unreported fishing, ocean acidification and marine pollution. Parties make voluntary commitments for which they are held accountable at each subsequent conference. This "virtuous circle" forms a complementary effort to multilateral action. Chile aims to complete the Easter Island consultation before the September 2016 session in Washington DC. Easter Island is complex: it is a living culture of 6,000 inhabitants, 40 percent of them indigenous Rapa Nui, and is a World Heritage site attracting 80,000 tourists a year. It has very high CO₂ per capita (supplies are brought in from the continent) and waste management issues due to tourism. Within the context of COP21, Monaco, France and Chile launched the "Because the Ocean" initiative, supported by more than 20 signatory countries. It focuses on the ocean as a relevant climate regulator and on the critical role it will play in the implementation of the Paris Agreement on climate change, and has already brought a lot of momentum to the strategy and policy debate.

François Simard asked the panel to explore how better to use MPAs as nature-based solutions to climate change, as today, they're mostly set up according to biodiversity criteria.

Christophe Lefebvre replied that MPAs are already laboratories contributing to science on climate change, allowing observation of temperature changes and migration of species, for instance. Better networking among MPA managers would increase the value of this, and help to identify where to create future MPAs. An important

challenge for the scientific community is to establish a methodology for conducting an inventory of ecosystem areas, key to preserving the ocean's climate change machinery.

Sebastian Troeng highlighted the phenomenon of spontaneous, pragmatic creation of protected areas by local communities, “things that go viral, that don't require investment but that people replicate automatically.” Local marine managed areas began in Fiji, rapidly spread throughout the Pacific islands, and are now appearing in the West Indies. We should study what makes a solution so attractive that people replicate it without any external pressure, funding, or promotion.

Dan Laffoley called for better valuation of all MPA benefits –not just biodiversity and climate change services but communities and livelihoods, including aquaculture. Studying and modeling climate trajectories – the rate and direction of change in the marine environment – will be key in deciding where to put aquaculture and MPAs. Global modeling tools can track species migration and forecast which species may go extinct when some places act as carbon sinks, and which other areas could become biodiversity reservoirs. “For truly sustainable aquaculture, you don't invest in places that will become unfavorable within 5 or 10 years”. Shellfish can no longer be grown along much of the western American seaboard because of acidification. We've been surprised by the speed of ocean acidification and warming; we should learn from that. We need to factor wider spatial management into MPA design and to think about functionality in a moving, changing world, not a static one, and we have tools for it.

Developing countries may struggle to finance tools to ensure MPAs succeed, **Waldemar Coutts** pointed out,

citing new technologies for protection and enforcement such as satellite applications. Chile seeks to use such technology in vast areas like Easter Island. Developing countries making significant efforts to contribute to the global climate change response should perhaps receive financial assistance. The panel then turned to the UNCBD global MPA target of 10 percent by 2012 (now 2020), which has been repeatedly delayed and revised.

Dan Laffoley suggested that this target is outdated and based on obsolete information. Whereas only 5 percent is likely to be protected by 2020, we now say at least 30 percent of the ocean should be in MPAs – and we must properly manage the rest of it. “If you want evidence, talk to the people who can't rear shellfish anymore because it's too acidic. Talk to the people whose fish stocks have moved. We have to change”.

Frederico Brandini agreed, adding that MPAs must not serve as an excuse for “doing whatever you want” in the 80-90 percent of the ocean that will remain unprotected.

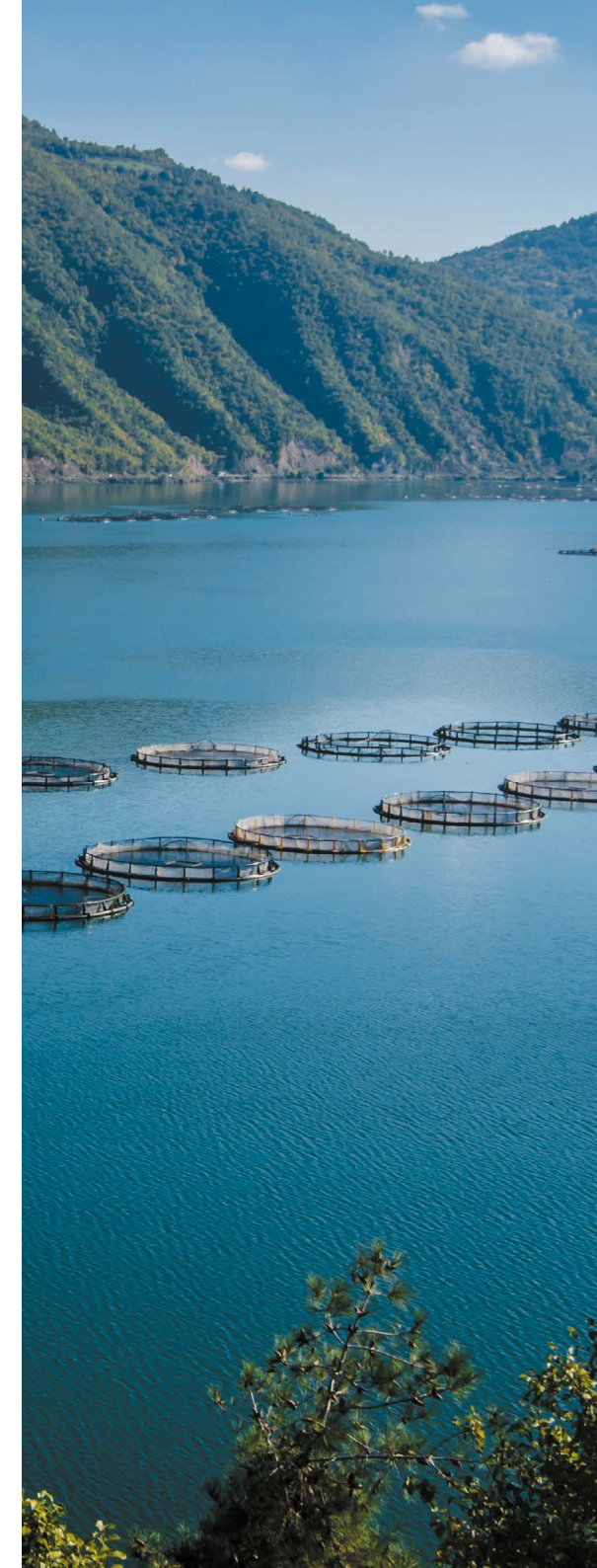
Christophe Lefebvre pointed out that only 20 to 40 of the 160 maritime countries will have achieved their MPA targets by 2020. Furthermore, many creations are incoherent: if you compare the CBD map of Ecologically or Biologically Significant Marine Areas and the map of MPAs, they don't overlap at all. We need to pursue coherence from both a biodiversity and climate change point of view. More enforcement was needed, without which MPAs are just “paper parks.”

François Simard noted that it is difficult in unprotected marine environments to determine the effect of climate change on fisheries, and to

separate its impact from that of irresponsible fishing. This offers another role for MPAs, which could serve as control areas to look specifically at climate change.

Waldemar Coutts addressed the question of MPAs in the high seas, indicating that current negotiations on areas beyond national jurisdiction “are all about that.” The challenge is to find a global mechanism that can coexist with current regimes – the high seas have many, including Regional Fishery Management Organizations (RFMOs), IMO shipping regulations, the International Seabed Authority, and others. Chile is part of the South Pacific RFMO, one of the world's newest and largest, which also has a biodiversity protection component.

François Simard summed up the session's main points. First, oceans' role in climate-change response is as or more important than that of forests, from temperature regulation to carbon sequestration, but we lack knowledge about precise mechanisms and measures. Secondly, the oceans themselves are threatened by climate change, especially due to acidification from CO₂, which is a very serious issue for biodiversity, livelihoods and other ecosystem services. Third, climate-change issues must be integrated into MPA design and management, and in management of MPA networks, for greater coherence and efficiency; this could incorporate the possibility of moving MPAs as conditions change. Finally, we need to achieve an MPA target of 50 percent in the high seas, but we don't yet have the means. While targets are important, they mustn't obscure the need to responsibly manage the whole ocean. Current negotiations on biodiversity beyond national jurisdiction – the subject of the fifth and final session of the day – are important for both.



SESSION 5

Updates on topical issues



Negotiations on BBNJ (Biodiversity Beyond National Jurisdictions)

Serge SÉGURA (Oceans Ambassador,
French Foreign Ministry)

Serge Ségura briefed MBI participants on the first session of the Preparatory Committee working on a draft law, under the UN Convention on the Law of the Sea (UNCLOS), for a legally binding instrument on conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. Ségura who had attended the session the previous week in New York recognized that the process was long and difficult, but was optimistic as to its chances of succeeding: "We've had over 10 years of debate and will probably have 10 more, but a lot of progress has been made". The key is the UN General Assembly's decision to create

an implementing agreement, or IA, rather than reopening UNCLOS - "the Bible of the oceans," as Ségura put it - which could have had unpredictable and unintended results. This tool has already been used, once in 1995 with an IA on fish stocks and again in 2001 with the creation of UNESCO underwater cultural heritage sites. The implementing agreement for BBNJ will account for new knowledge about marine biodiversity that did not exist when UNCLOS was signed over 30 years ago. Getting the UN General Assembly just to sit down together to discuss the new IA was "quite an achievement." "Six months ago I doubted the process would succeed, but now I'm convinced it will be a success". The main items discussed were: the scope of the agreement and its coexistence with other tools; guiding approaches and principles; marine genetic resources and how to share their benefits; area-based management tools such as MPAs; en-

environmental impact assessments, and the question of marine technology transfer and capacity building.

The difficulty of defining BNJ, given that some countries have not claimed their legitimate exclusive economic zones must be noted. The same applies with regard to the continental shelf: countries are entitled to increase theirs through a process created by the UN Convention, but it takes several years, raising the question of whether or not to include these areas as BNJs in the interim. The second point, that of marine genetic resources, is also complex. The G77 group of developing countries and China want these resources to be considered the common heritage of mankind – which already applies to mineral resources of the zone – but the consequences of that are not clear. Then there is the question of benefit sharing. An equitable regime is not so easy to find, nor is deciding which benefits will be shared, whether intellectual property or monetary gain. This will require intensive discussion not just among countries but also with private firms. An important milestone was reached with the agreement to include fisheries in the implementing agreement. Many countries wanted them excluded, arguing that they were already governed by other tools such as regional fishery management organizations, or RFMOs. “But what is an IA on protecting marine biodiversity and sustainable use if you don’t talk about fish?”, Ségura pointed out.

The issue now is to find language that shows we also believe in RFMOs and their results. The question of Marine Protected Areas will be complicated: Russia in particular insists on the need for strong science-based criteria for their creation, and we will not avoid discussion on this. “It will be long and difficult but I felt a new atmosphere

in New York and we have to use it”. The fact that it is an open, public discussion in the presence of NGOs is very important: “It creates a strange atmosphere among states because we know that we are closely observed, and that can be very useful for some of us”.

SDG 14 on Oceans (Sustainable Development Goals)

Patricio Bernal (Facultad de Ciencias Biológicas Chile; Coordinator IUCN High Seas Initiative, Global Marine and Polar Program)

Patricio Bernal offered an update on SDG 14, which the UN General Assembly adopted last autumn. It pertains to the conservation and sustainable use of oceans, seas and marine resources, and represents the first time the ocean community has managed to place oceans in the larger development picture alongside goals regarding poverty, hunger, education and health. SDG 14 comprises ten targets: Prevent and reduce marine pollution; By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts; Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation; Effectively regulate fishing and end overfishing and destructive fishing practices; By 2020, conserve at least 10 per cent of coastal and marine areas; Prohibit fisheries subsidies that contribute to irresponsible fishing; By 2030, increase the economic benefits to small island developing states and least developed countries from the sustainable use of marine resources; Increase scientific knowledge, develop research capacity and transfer marine technology; Provide access for small-scale artisanal fishers to marine

resources and markets; Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS.

These targets each come with difficulties. Reducing marine pollution touches on sticky issues of national sovereignty, such as pollution from land-based sources, for instance. With regard to access to marine resources and markets for small-scale artisanal fishers, the question is one of better regulating access to fishing resources to correct an unequal relationship with big industrial fisheries. The important thing is to ensure that the agreement be an accountable process for every country and not just a piece of paper. The UN’s First Global Integrated Marine Assessment is a tool to help with this, and a wealth of resources on many marine subjects including aquaculture. Its 55 chapters provide a holistic overview of ocean issues and marine biodiversity and highlight the role of science-based research in future decision-making. The assessment is presented as a living document that anyone may consult online <http://www.worldoceanassessment.org/>.

A second ocean assessment is underway and should be published by 2022. Governments have also been working to establish indicators, and have agreed on 149 out of a total of 229. Another instrument for ensuring accountability is the UN Conference on Oceans and Seas, which will take place every three years. The next one will be held in Fiji in June 2017. Meanwhile, the Our Oceans conference continues to add momentum, with the next meeting scheduled for Sept. 2016 in Washington D.C. Above all, the highly ambitious goal of SDG 14 will require a lot of action by governments. Institutions dealing with terrestrial issues are much stronger

than those of the ocean community – they have a longer history and a familiar tool kit they can use. Therefore, strengthening government institutions that deal with the ocean will be a big challenge, and we need to work at the regional, national and international levels to achieve this.



Conclusions

With a lower environmental footprint than many other animal production systems, while offering high-quality protein, Aquaculture is a major opportunity for Latin America and a good societal choice if planned and managed sustainably. However, lots of obstacles remain. Aquaculture development must balance economic, social and environmental objectives, which requires efforts from producers, science and governments. Licensing should be an instrument for achieving sustainability, and market mechanisms should be introduced to create incentives. Research ought to shift its focus to what farmers need for implementation and sustainability on the ground. Efforts are needed to ensure aquaculture does not compete with fisheries, and to integrate the two types of production. Numerous small pilot projects show aquaculture can offer local communities social benefits such as better food, income and development opportunities. The consumers' role in demanding, through information and traceability, a product that is socially, environmentally and nutritionally acceptable is a key factor. Standards and certifications put aquaculture high on a limited list of sustainable foods. Industry actors should not work in isolation but all together towards truth, transparency and transformation if we are to be successful in engaging consumers and stakeholders.

HSH Prince Albert II of Monaco

"Things are moving forward. Aquaculture has proved it today, progress is being made. By making a connection between global issues and consumer practices, by addressing environmental issues whilst offering solutions with regard to nutrition, energy and health, the economic lever can now be at the heart of ocean protection. It is by mobilizing producers around tangible and positive objectives that we will manage to do so. But above all it is by offering real benefits to both consumers and the local populations that we will make the change happen. However there is often a gap between conviction and action. Most often this gap is due to the economic reality that it is still uncertain. In view of this, today it is essential that we implement the conditions that will enable us to overcome any obstacles and promote the development of sustainable growth. Especially as

far as aquaculture is concerned, but also marine protected areas, and the energy transition, the role of the public authorities should be to foster models which will enable burgeoning initiatives to be fully deployed. It is by introducing this notion of sustainability, through incentives or regulations, through the invention of innovative mechanisms, and by promoting this sustainability economically speaking, that we will be able to create the conditions for genuine change. This renewal is near. It merely requires us to have the courage, the openness and the freedom to let it come. Let us therefore trust our ability, that of scientists, environmental players, political leaders and businesses, and let us mobilize them through dialogue, experimentation and will."



“Due to environmental issues, climate change and the economic crisis, circular economy principles are gaining traction as an alternative model to the traditional linear one, which produces excessive waste and threatens our economies, ecosystems and even survival.”

Raphaëla Le Gouvello

“There is a need to shed the monoprodukt mentality (meat with meat; fish with fish, based on big centralized units) and develop small, decentralized units able to manage different products from fisheries, aquaculture and agro-industries to create a local circular system with a biorefinery strategy”.

Jean-Pascal Bergé

“We have to change our business models from the old linear approach - one species, one process, one product - to the integrated, sequential, biorefinery approach: one species, several processes, several products”.

Thierry Chopin

“If you are producing high-priced sustainable seafood for just a niche market, you leave most of the market out, and we can't call this sustainable.

Werner Jost



“There is a strong need for outreach and capacity building. We can't just let people try to learn aquaculture by themselves and waste years trying to learn something we already have the technology for”.

Silvio Romero Coelho

“Collaboration is key: Industry actors cannot work in isolation - none of us can! We should all work towards truth, transparency and transformation if we are to be successful in engaging consumers and stakeholders.”

Roy Palmer

“We should stress the importance of breaking down barriers, political or otherwise, among possible actors of a circular economy combining agriculture with aquaculture. There is the potential for a very powerful coalition provided we de-cluster our silos and take a holistic approach to sustainability”.

Pascal Lamy

“MPAs are a nature-based solution for preserving marine ecosystems that help with climate change. We should integrate climate change and resilience into national, regional and global strategies, and MPA networks”

Christophe Lefebvre

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The Oceanographic Institute uses a wide range of communication tools covering all publics: the "Maison des Océans" in Paris and the Oceanographic Museum of Monaco for expert symposiums, public conferences and exhibits; editions; internet and social networks.

For more information: www.institut-ocean.org - Tel: +377 93 15 36 00
Facebook: Oceanographic Institute, Foundation Albert I, Prince of Monaco
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The 8th Edition Monaco Blue Initiative
will be held in Monaco on 2nd-3rd April 2017.
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