



POLICY PAPER

Opportunities and Challenges to Fisheries Policy in the Philippines Today



ABSTRACT

A framework on the structure and dynamics of fisheries management is described. It is used to identify four opportunities and two challenges for fisheries policy in the Philippines if it were to rationally harness fisheries as fulcrum for sustainable food and protein security in the country in the next 10-30 years. This is, when climate conditions in the country (and in the world) may reach irreversible changes per some reports. Four specific recommendations on the focusing policies are presented if the Philippines were to achieve a more environmentally-anchored (“greener”) management of fisheries: reconciling and balancing public and private sector interests over fisheries; providing incentives for “green investments” on fisheries; ensuring the economic and ecological sustainability of culture fisheries as a pressure-easing complement to capture fisheries, and rationalizing land use to improve the viability of culture fisheries.

Ben S. Malayang III^{1*}
 Enrique G. Oracion²
 Mylah R. Bomediano³
 Hilconida P. Calumpong⁴
 Rene A. Abesamis⁵
 Roberto D. Montebon⁶

¹ Institute of Environmental and Marine Sciences, Silliman University, 1 Hibbard Ave, Dumaguete, 6200 Negros Oriental; and South Negros Site (SN), USAID Fish Right Program with BFAR and the Philippine Government (USAID-FRP)

² Department of Anthropology and Sociology, Silliman University; and SN-USAID-FRP

³ College of Business of Administration, Silliman University and SN-BFAR-USAID-FRP

⁴ Silliman University and SN-BFAR-USAID-FRP

⁵ Silliman University Angelo King Center for Research in Environmental Management (SUAKREM) and SN-USAID-FRP

⁶ SN-USAID-FRP

Key words: *fisheries policy; food and protein security; ecosystems approach to fisheries management; capture-culture fisheries complementation; green investments; climate resilience*

*corresponding author:
 beniiim@icloud.com

INTRODUCTION

Fisheries policy in the Philippines has been persistently faced with the challenge of availing of the country's vast fisheries stocks without losing them eventually. It seems that this has been largely a failure concerning capture fisheries. Production has been recently declining as indicated by historical (**Figure 1**) and recent data (**Table 1**). These are despite rising domestic demand (**Table 2**) and expanding fishing efforts (Dy 2018).

Commercial fishing declined by 14.5% and municipal fishing by 2.8% from 2016 to 2018. This is an aggregate decline of capture fisheries by 8.6% in a 3-year period. On a per capita basis, the combined reduction of

commercial and municipal fisheries production in 2016 to 2018 was even more pronounced at 11.1%.

But stocks from culture fisheries have been increasing slightly. The sector produced 2,200,931.34 MT in 2016; 2,237,790.76 MT in 2017; and 2,304,365.31 MT in 2018. This is an increase of 4.7% in 3 years.

Production from culture fisheries helped to offset the decline in capture fisheries. The total fisheries production in the country from both capture and culture fisheries was 4,455,810 MT in 2016 and 4,356,97 MT in 2018. This was a 2.0% decrease in volume. In per capita terms, this

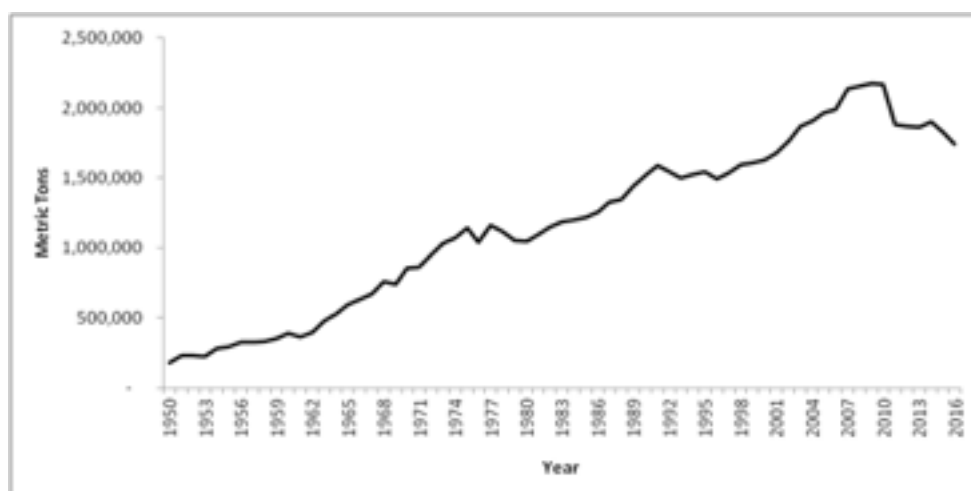


Figure 1. Marine capture fisheries production in the Philippines from 1950 to 2016. (Source: FAO 2018).

Table 1. Annual capture fisheries production in the Philippines 2016-2018.

Sector	Annual Capture Fisheries Production (MT)		
	2016	2017	2018
Commercial	1,106,948.05	948,281.45	946,437.62
Municipal	1,137,931.03	1,126,017.30	1,106,071.04
TOTAL	2,244,879.08	2,074,298.75	2,052,508.66

Source: Fisheries Statistics of the Philippines (PSA 2019)

Table 2. Philippine population, 2016-2018.

Year	Total Population	Annual Growth Rate (%)
2016	103,663,816	--
2017	105,172,925	1.46
2018	106,651,394	1.41

Source: Worldometers (www.worldometers.info//)

meant a reduction of 4.7%, which could have been higher if not for the increase in culture fisheries production.

If these 3-year trends continue and no major policy intervention is done on conserving capture fisheries and expanding culture fisheries production, then quite possibly, the Philippines, with a population growth rate of 1.5% (2017), would be jacking up its fisheries importations in the years ahead.

FRAMEWORK

Policy opportunities and challenges in fisheries management in the Philippines may be gleaned from two assumptions about fisheries management: its structure, and its dynamics.

Assumption on the Structure of Fisheries Management

Fisheries management has four structural dimensions: regulation of access to fisheries; reduction of the economic, social, political, and cultural pressures to access fisheries to beyond their sustainable levels; public and private capital and investments in good and sustainable fisheries; and the size of the managed area.

Regulation of access to fisheries. This is about addressing the supply side of fisheries management. It involves imposing legal and social fences around capture fisheries of interests, in the times and places where they are harvested, to keep their stocks within sustainable levels.

Reduction of fishers' pressures to harvest fisheries. This about addressing the demand side of fisheries management as a necessary complement to regulating access. It involves offering fish catchers with alternative means to derive income that would give them higher marginal returns to efforts compared to fishing in order to ease their propensity to engage in illegal, unreported, and unregulated fishing (IUUF), over-scaling catch rates to unsustainable levels, or violate access regulations. This may also involve supporting the fish culture industry to give it higher returns of investments (ROI) than capture fisheries and so give it a price advantage that would raise the market's preference for cultured fisheries.

Public and private investments in fisheries management. Investments on fisheries management include capitalizing the processes of rule-making, rule-using, rule-benefitting, and rule auditing. These investments may include engaging social, political,

informational, intellectual, and financial assets as capital to support these processes. Rule-making is often a public sector domain using the political and fiscal assets of government to govern behaviors in the fisheries sector. Rule-using is often the domain of fishers, fish farmers, and fish traders and vendors to use rules to legitimize their behaviors toward fisheries. Rule-benefitting is the domain of fish consumers and fisheries processors to optimize their gains from fisheries. Rule-auditing is often the domain of civil society and citizen advocacy groups to ensure that rules are shaped, used, and give benefits that are equitable and sustainable. It is assumed that if investments in these processes were to involve a wide array and combination of public and private assets, then they would likely result to more socially-responsive, evidence-based, and locally-adaptive fisheries management.

Size of managed area. This refers to the expanse of the area being managed. Its size dictates the scale of the measures to regulate access and pressures to access, and of the investments on these measures. Three areal scales are crucial: the ecosystemic reach of management and whether or not it matches the scale of the ecological domain of the fisheries of interest; the area to be covered and the consumer population that is to be served by management investments, and whether or not the scale effects of the investments are significant across them (e.g., satisfy the food and protein needs of consuming communities); and the jurisdictional and institutional reach of fisheries sector rule makers, rule users, rule beneficiaries, and rule auditors, and whether or not their reach covers the ecosystemic domains of the fisheries being managed and the scale of the investments to manage them.

Assumption on the Dynamics of Fisheries Management

Access to fisheries (the ability to capture and culture fisheries) declines when the power of regulations to restrict fishers' access to the fisheries exceeds the power of the pressures on fishers to access the fisheries. Conversely, access goes up when the pressures to access exceeds the power of the regulations to restrict access.

Being associated with access, IUUF and fishing scale (or the volume of fisheries that are harvested) go up when access regulations are weaker than the pressures to fish. Conversely, IUUF and fishing scales go down when the pressures to fish weaken against the restrictive powers of access regulations.

Public-private sector partnerships (PPP) provide arrays of differently-constrained assets that could

be added up and made to complement each other, to strengthen fisheries management.

Fisheries management is effective when restrictions on access, and pressures to access, approaches unity. That is, when IUUF approaches zero and fishing scales by volume do not exceed maximum sustainable yields (MSY).

The volume and diversity of social, political, informational, intellectual, and financial investments on environmentally safe and sustainable (or "green") fisheries management, directly affect the breadth of public interests that it covers. This improves its political legitimacy and enhances its effectiveness, equity, and sustainability.

Effective fisheries management is directly related to the extent it covers the range of ecosystem services that support and sustain the species and fisheries being managed. Conversely, if the compass of the management do not cover the range of these services, its effectiveness declines.

To the extent PPP improves the capacity of fisheries managers to balance access regulations with the fishers' pressures to fish, and do so across a wider range of ecological systems that are relevant to the fisheries being managed, the effectiveness of fisheries management is directly related to the intensiveness and breadth of PPPs on it.

THE CLIMATE CHANGE CONTEXT OF FISHERIES POLICY IN THE YEARS AHEAD

Climate change would likely set the context of fisheries policies in the Philippines in the immediate (10-30) years ahead (*BTI 2020; Watts 2018*). Policy would need to address supply pressures due to rising surface temperatures of waters and lands; frequent and extreme flooding; El Niño/La Niña risks; rising seas probably by 12% more by 2050 than has been previously estimated, and by 3 m by 2200; frequent and severe heat waves; the seas getting more acidic, less oxygenated, and getting more stratified so that their top and bottom layers would not mix as much (*SIPCC 2019*); and land use pressures that constrict land areas for fish culture.

Extreme events as a result of climate change have resulted in destruction of seaweed farms, fish cages, fishponds, and other aquaculture facilities resulting to heavy losses. The Philippines dropped as the world's third largest seaweed producing country in 2017 and

replaced by the Republic of Korea due mostly to the series of typhoons that have hit the latter's farming areas (*Ferdouse et al. 2018*).

The climate change resilience of capture and culture fisheries would be a key concern of fisheries policy in the Philippines in the years ahead

As well, policy needs to address the demand pressures of unchecked population growth and distortions in the food supply chain due to inefficiency, speculative trading, and leakages (*Read et al. 2020*), and higher climate risks.

Climate change complexed by high population growth and limited resource space will worsen poverty so that the supply-demand structure of the Philippine fishery sector could radically change, and managing fisheries and the governance of the fishery sector would become a more systemically difficult and complex affair (*Fernandez 2009*).

POLICY OPPORTUNITIES

In the face of anticipated impacts of climate change on the Philippines (*PCCC 2018*), it is crucial that the country's fisheries policy should focus on creating a favorable regulatory and incentives regime that expands "green" public-private partnerships and investments in the following areas:

Sustaining Fisheries as Fulcrum of Food, Protein, and Nutritional Security

It is clear that the Philippines is highly dependent on the primary productivity of its "blue environment". We have 220 million ha of it.

And yet, most of our development investments have traditionally focused on land-based production and assets, which are confined to only 29.8 million ha (*Velasco and Cabanilla 2003*). It would be necessary (if not rational) to redirect more of our investments on protecting and developing, the capabilities of our vaster aquatic assets to provide our people the food and nutrition they need. This includes harmonizing the investments in production and protection goals of managing the assets, to ensure the ecological viability and sustainability of their biodiversity and stocks.

Improving Ecosystemic Approaches to Managing Fisheries

Republic Act (RA) 8550 (The Philippine Fisheries

Code of 1998) as amended by RA 1054 in 2015, mandates an ecosystem approach to managing our country's fisheries. This is to breach the traditional LGU-centric approach of managing our coastal ecosystems, which are the garden oases of our archipelagic capture fishery. Coastal ecosystems are often not confined to within LGU limits and so their biodiversity and stocks depend on ecosystem services transcending LGU municipal waters.

Similarly, fish culture requires ecosystem services like provisions of water and regulating microclimates that are associated with watersheds that often cross LGU boundaries.

Shifting from LGU-centric to ecosystemic fisheries management requires a determined push because LGU executives tend to confine their political investments in only where they depend for continuance of their power and position.

Expanding Current Efforts to Address the Supply-Demand Pressures on Capture Fisheries

The present thrust of fisheries governance and management in the Philippines is stock and biodiversity protection of capture fisheries. The Fisheries Management Area (FMA) program of the Bureau of Fisheries and Aquatic Resources (BFAR) places emphasis on sub-regional levels of collaborative and multisector ecosystemic protection of stocks and habitats.

Civil society groups are engaged with government agencies and LGUs in interdicting IUUF operations using satellite- and community-based detection options, prosecuting illegal fishers and gears, instituting harvest controls, establishing Marine Protected Areas (MPAs) and MPA networks, and in general addressing supply side opportunities to improve stocks, protect biodiversity, rationalize the fisheries supply chain, and reduce fishers' economic and social pressures to violate regulations, and to fish to beyond sustainable yields.

These efforts need to be boosted to soonest achieve upturns and sustainability of capture fisheries supply in the country, in the face of its mounting pressures.

Expanding Incentives for Culture Fisheries in Ecologically-appropriate Uplands

This is to ease demand pressures on capture fisheries and fill domestic supply gaps on the nation's fisheries requirements. Aquaculture is a good option for fish

production under climate change conditions (*Weatherdon et al. 2016 c.f. Barange et al. 2014*). It has a lower resource use footprint than livestock and other protein dense foods (*FAO 2010a*). It would help ensure that our fisheries-based food, protein, and nutritional security – already fragile because of our high population growth rate – be shielded from the vagaries, fickleness, and less locally-controllable external markets and global supply chain (*Olin et al. 2011*), and risks of extreme events due to climate change.

Comparably, fish culture offers much less benefits in terms of widening fisheries biodiversity. There's more species diversity in the wild than could be raised in pens. But by easing demand pressures on wild stocks, in ways that limit their ecological costs to less than the gained benefits from lowered pressures on wild stocks, culture fisheries – including non-fish commodities like seaweeds -- would be a big boost to fisheries biodiversity.

For these four development goals to be successfully achieved, it is crucial that fisheries PPPs be:

- Founded on high-legitimacy fisheries management across the ecosystemic ranges of the fisheries being managed;
- Tandemed by high fiscal support for implementing RA 8550 as amended by RA 10654, and for BFAR's FMA program;
- Complemented with sufficient fiscal and regulatory incentives for LGUs to collaborate across fisheries ecosystems in building up citizen support for "green" fisheries.

CHALLENGES

Policy shifts toward PPP-centric and localized ecosystemic management of fisheries in the Philippines face two key challenging constraints:

The Traditional Focus on "Brown" Development

The development culture and politics of the Philippines lean heavily toward improving the value and utility of land assets. Since the country became an independent Republic following World War II, its development capital including those sourced from foreign aid have been poured mostly on investing in land-based production capacities and productivity support infrastructure. Simply, because over the years the Filipinos' sense of progress and development has been anchored on continental paradigms that largely discount land as a constraint to growth (<https://www.oecd-ilibrary.org/sites/9789264269088-5-en/index.html?itemId=>

[content/component/9789264269088-5-en](https://www.oecd-ilibrary.org/sites/9789264269088-5-en)).

Of the over 200 development projects presently being executed by the Philippine government, only 9 have something to do with marine resource utilization and production: fishport development, fisheries market construction, channel improvement, and lake management (www.gov.ph May 2, 2020).

Public and private sector investments on food production have been more in land-grown crops, and comparably much less on fisheries (<http://boi.gov.ph/industry-development/industry-development-program/roadmaps/agribusiness>). Investments in "brown" productivity and amenities offer more political dividends than investments in "blue" production systems (*Fabinyi 2009; Song et al. 2017*). Overcoming this development culture that's closely linked to the country's traditional transactional politics would be a big hurdle for policy shifts toward heavier investments on "blue" resource systems.

The Technical Constraints on Sustaining Fisheries

Wild fisheries are supported by complex interplays of ecosystems. They are "ecosystems of ecosystems" (or "meta-ecosystems") (*SN USAID FRP 2019*). Land-sea interactions create aquatic features that influence much of the conditions of the life support systems of fisheries in the wild (*Le Tissier et al. 2006*). Climate and weather affect both capture and culture fisheries (*IPCC 2019*). And extractions driven by dynamics of demographic and socio-ecological systems add up to make fisheries management a difficult enterprise for achieving resource sustainability under anticipated climate-change scenarios in the Philippines (<https://www.gaia-discovery.com/agriculture-industry/factors-causing-philippines-fisheries-to-collapse.html>).

In the case of capture fisheries, the breadth of its contiguous meta- and socio-ecological contexts make them difficult to manage for sustainability (<https://www.gaia-discovery.com/agriculture-industry/factors-causing-philippines-fisheries-to-collapse.html>).

In the case of culture fisheries, location, land use and land tenure systems (*FAO 2010a*), feeding and feed stocks (*FAO 2011*), broodstocks and pathogens (*FAO 2010b*), water supply and uses, and soil physics and chemistry (*FAO 2010a*) are complex considerations for sustaining production and industry productivity (*FAO 2011*).

Unless addressed, these challenges are likely to

impede successful policy shifts toward expanding sustainable “blue” productivity as locus of national food security in the Philippines.

RECOMMENDATIONS

Fisheries policies in the Philippines must shift their focus on four issues that, if successfully addressed, would likely lead to a “greener” management of fisheries in the country:

- Reconciling and balancing public and private sector interests over fisheries;
- Providing incentives for “green investments” on fisheries;
- Ensuring the economic and ecological sustainability of culture fisheries as a complement and pressure-easing system to capture fisheries, and
- Rationalizing land use to improve the viability of culture fisheries.

Reconciling and Balancing Private and Public Interests

As has been indicated in several studies, decision making over environmental policies and resource uses in the Philippines are a complex process of stakeholders competing for influence on the decision (*Malayang 2004; Rola et al. 2004*). There are confluencing and conflicting interests over resource governance and management such as on fisheries. Policy and regulatory contents and thrusts continually contort in response to which stakeholders hold the most sway or power over rule making in the sector. It is imperative that policy provides mechanisms and incentives for:

- Public and private sector stakeholders to develop a common short and long-term development programs on fisheries.
- Rationalizing the governance and management structures of fisheries to widen the participation of different sectors and stakeholders of the industry.

Robust private-public partnerships create larger pools of social, political, and technical capital, and offer broad spaces for reconciling and balancing multiple interests.

Reconciling interests and balancing powers over policy requires, at the least, continuous and sustainable consensus building (*Lewins 2001*). Sadly, this is a rare capability for many public sector organizations especially LGUs that are severely structurally constrained to invest on long term interests. But if benefits are proportionally congruent to costs, organizations, including LGUs, would

be sufficiently incentivized to enter into a consensus (*Ostrom 2000*).

The government could consider amending RA 8435 of 1997 (or the Agriculture and Fisheries Modernization Act of the Philippines [AFMA]) to strengthen the country’s Fisheries and Agriculture Resource Management Councils (FARMCs) as platforms for multisector and multi-LGU collaborations and partnerships on the development and investments in capture and culture fisheries, focusing on:

- Changing the manner they are constituted; the equity and spread of their representations among municipal, commercial, and capture fishers, supply chain players, consumers, and regulators; and reducing their vulnerability to political and sectoral capture.
- Expanding their representations in local Development Councils and expanding their powers to vet and infuse fisheries interests in local development plans, budgets, and public investments.
- Giving them additional powers to propose, participate, and influence local legislative and executive actions on widening PPPs in catch and culture fisheries.

Incentivizing Shifts Toward “Green Investments” in Fisheries

Control of production systems creates power to those dominating decision making in the system. Shifting to fisheries as fulcrum for public and private investments on primary production, away from the traditional land-dependent agriculture and industries, should recognize the need to sensitively navigate the complex and deeply embedded cultural, social, and political agrarian power systems in the country.

Because in the Philippines, political power has been traditionally tied to land ownership and land-based production shifting the bulk of public development investments to capture and culture fisheries would be likely resisted. It would be crucial that “brown power holders” be made to find it to their benefit to develop the “blue economy” in “green” ways.

A key incentive is information: to convince them that “business as usual” in the brown system would not be sustainable in the medium to long terms.

Increasing investments on regulating capture fisheries would likely continue to be resisted by the politically powerful commercial fishing fleet operators, who see regulations as cost items with low marginal returns to them. Municipal and artisanal fishers would likely also resist regulations because they add to their capital

costs that they could already barely afford.

A shift toward fish culture could be resisted by the traditional power blocs in commercial capture fisheries, and from vote-rich artisanal fishers. But if they see the shift to fish culture as a new arena to secure their interests, they would be incentivized to invest on it.

Investing on low-externality fisheries would reduce regulatory and social costs of the investments. It would improve net earnings and would likely expand its wealth-creating potentials and sustainability.

The government could consider putting together a package of legal, financial, technical, and marketing assistance to encourage land owners and fishers to venture into and invest in fish culture (*FAO 2010a*), and complement these with the following supporting measures to sustain the momentum of the investments (*FAO 2005*):

- Increasing the commitments for fisheries sector credit under RA 10000 (the Agri-Agra Reform Credit Act) and providing regulatory and “ease of availment” incentives for “green” investments and PPPs in fisheries.
- Increasing fiscal commitments to incentivize and support PPPs on protecting and conserving capture fisheries, focusing on: Expanding MPAs and MPA networks to cover a total area that would achieve a significant impact on stocks and biodiversity; Expanding the use of technology for interdiction and enforcement; Intensifying public education on the high social and economic costs of IUUF; Mobilizing consumer and citizen participation in promoting consumption of only compliant fisheries; Improving supply chain control to achieve higher incomes for catchers and intensify market denials of IUUF products; Improving harvest controls and fishers’ safety nets; Improving social and economic equity in the industry; Expanding fishers’ participation in fisheries management; Increasing the resilience of catch fisheries to climate change risks and vulnerabilities; and Expanding livelihood options for catch fishers.
- Increasing fiscal commitments to incentivize and support “green investments” and PPPs on fish farming and other aquaculture enterprises focusing on: Instituting clear institutional frameworks on property rights and participatory processes on investments in culture fisheries; Defining values and obligations on strengthening the economic and ecological connectivity of “green” aquaculture investments through education, information, and training; Providing production incentives like tax breaks on investments, subsidies

on infrastructure and technologies, R&D support to employ modern technologies to boost production, special advantageous licenses for engaging in integrated aquaculture, polyculture, and income tax incentives for employing ecologically sound and low externality land and water management practices; and Providing market incentives like preferential pricing and supply chain access to lucrative buyers, R&D support to employ modern technologies for enlarging footprints and shares in e-Commerce and markets, special certifications, and tradeable property and access rights for ecologically compliant culture fisheries.

Ensuring the Economic and Ecological Sustainability of Culture Fisheries as Complement to Capture Fisheries

To better complement and ease demand pressures on catch fisheries, culture fisheries need to be developed much further (*FAO 2010a*). It still has low resilience to risks and is hardly sustainable.

There’s need to ensure that the economic benefits of culture fisheries would be significantly higher than its social, economic, and ecological costs. Critical would be beefing up the resistance of penned stocks against diseases and to correct their heavy dependence on wild catch for fish meal, fish oil, wild seed, juvenile for fattening, and broodstock. Genetic care would be critical because this could affect the long-term viability of the stocks and their resistance to pathogens and diseases. Seaweed farming is dependent on source stocks that have low genetic variability and so are highly susceptible to the “ice-ice” disease (*Zuccarello et al. 2006*)

Guided by the ecosystem framework of development, the alteration of inland and coastal habitats for the construction of ponds and aquaculture systems has to be properly implemented and guided by local land use plans and protocols.

The threats of anoxic sediment build-up and benthic community modification have to be mitigated. Good conservation and management practices need to be observed. Public trust and support must be gained. These are crucial to ensuring the viability of culture fisheries in the long run (*Song et al. 2017*).

The government could consider:

- Requiring DA-BFAR to provide a package of technical and financial assistance and incentives for LGUs to develop and execute Fish Culture Roadmaps that would

explicitly anchor the sustainability of fish culture enterprises on three grounds: economic viability, ecological soundness and social equity and acceptability;

- Requiring the Department of Trade and Industry (DTI) to develop and execute a program to strengthen the value chain of fish culture products that is resilient to calamities and pandemics, and resistant to rent-seeking;
- Providing a mix of fiscal and regulatory incentives for ecologically-compliant and socially equitable PPPs on aquaculture development, and disincentives for production externalities.

Rationalizing Land Use

To meet two policy interests of the Philippines to (a) sustain capture fisheries (RA 8550 [Republic of the Philippines 1998] as amended by RA 10654 [Republic of the Philippines 2015]), and promote rational land use (EO 72 [Republic of the Philippines 1993a], MC 54 [Republic of the Philippines 1993c], and EO 124 [Republic of the Philippines 1993b]), culture fisheries could be considered an option in the use of marginal lands.

In public lands, fish culture could be designed as an “intercropping complement” of production and protection forests and wildlife conservation. If properly sited in basins, shallow gorges, and dales, and ecologically designed, they could serve as water catchments and tanks to both hold water and increase percolation. Intercropping fish culture with tree growing, water holding, and biodiversity conservation in watersheds, would address the traditional woes of aquaculture in the country (<https://www.eurofishmagazine.com/sections/trade-and-markets/item/217-difficult-times-for-the-global-shrimp-industry>).

In farm areas, fish culture could be encouraged as an additional cropping system where it is technically and ecologically feasible and appropriate.

Land areas viable for upland fish culture often cross LGU jurisdictions and those under the authority of different national government agencies. If they are to be used for fish culture and is classified “exempted” for land distribution, the Department of Agrarian Reform (DAR) would have to have a say. If they are “idle” hilly lands or deemed poor for agricultural, the Department of Agriculture (DA) would have the say. Land use classifications are filed in the Department of Interior and Local Government (DILG) and relevant LGUs.

Inter-agency collaborations continue to be plagued by ineffectiveness and inefficiencies (*Fidelman et al.*

2014) and this poses risks to the viability of fish culture as an industry (*Song et al. 2017*).

The government could consider:

- Designating fish culture as an explicit category of land use for areas least suited for agriculture, and, subject to clearly defined ecological parameters, as compatible production enterprise in watersheds;
- Amending Republic Act 8435 (otherwise known as the Agricultural and Fisheries Modernization Act of 1997 [Republic of the Philippines 1997]) to mandate inter-agency and LGU collaboration and coordination in identifying, assigning, and developing lands appropriate for fish culture in hilly and upper lands;
- Mandating the Departments of Agriculture (DA) and of Agrarian Reform (DAR) and LGUs to facilitate the adoption of fish culture as a multicrop farming option, providing farms that do so with technical and financial assistance. A model of this is Bayawan City in Negros Oriental (*Oracion et al. 2015*);
- Requiring LGUs to include fish culture as a local land use and zoning classification in their Comprehensive Development Plans, Comprehensive Land Use Plans, and Forest Land Use Plans, with specific restrictions on the extent it is to be undertaken.

The sooner these measures are packaged together into a comprehensive fisheries policy, the better prepared the Philippines would be when “new normals” begin to emerge as climate change approaches “tipping point”, and the supply-demand pressures on the country’s fisheries intensify.

REFERENCES

- Agcaoili, L. 2020. “Agri-Agra Loans grow 11% to P714 billion in 9 months.” *Philippine Star*, January 3.
- Barange, M., Bahri, T., Beveridge, M.C.M, Cochrane, K.L., Funge-Smith, S. and Poulain, F. 2018. Assessing Climate Change Vulnerability in Fisheries and Aquaculture. Food and Agriculture Organization Technical Report, Rome.
- BTI. 2020. “The Final Decade.” A policy paper of the Brain Trust, Inc. on the impact of climate change on, among others, the primary production sector of the Philippines; cdn.fbsbx.com; 2019.
- Choulamany, X. 2005. “The Importance of Upland Fisheries in the Lao People’s Democratic Republic: A Case Study.” Paper in a publication from the proceedings of the NAFRI organized workshop on “Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving

- Upland Livelihoods” held in Luang Prabang from January 27 – 30, 2004. Retrieved on 18 March from <http://lad.nafri.org.la/fulltext/LAD010320040583.pdf>
- Crespi, V. and Lovatelli, A. 2011. “Aquaculture in Desert and Arid Lands: Development Constraints and Opportunities.” Food and Agriculture Organization Fisheries and Aquaculture Proceedings of the Technical Workshop on 6–9 July 2010 in Hermosillo, Mexico. 216 pp.
- Dy, R.T. 2018. Philippine fisheries dying. *Business World* June 18.
- Fabinyi, M. 2009. “The Politics of Patronage and Live Reef Fish Trade Regulation in Palawan, Philippines.” *Human Organization* 68 (3): 258-268.
- FAO. 2005. *Putting into Practice the Ecosystem Approach to Fisheries*. Food and Agriculture Organization, Rome. Retrieved on 9 December 2019 from <http://www.fao.org/3/a0191e/a0191e00.htm>.
- FAO. 2010a. *Aquaculture Development 4 Ecosystem Approach to Aquaculture (Report 5-04)*. Technical Guidelines for Responsible Fisheries, Food and Agriculture Organization, Rome. Retrieved on 9 December 2019 from <http://www.fao.org/in-action/globefish/publications/details-publication/en/c/346106/>
- FAO. 2010b. *Farming the Waters for Food and People. Proceedings of the Global Conference on Aquaculture 2010*. Food and Agriculture Organization (FAO), Network of Aquaculture Centres in Asia-Pacific (NACA) and the Royal Thai Department of Fisheries (DoF). Retrieved on 9 December 2019 from <http://www.fao.org/3/i2734e/i2734e.pdf>
- FAO. 2011. *Aquaculture Development 6 Use of Wild Fishery Resources for Capture-based Aquaculture (Report 5- 06)*. Technical Guidelines for Responsible Fisheries. Food and Agriculture Organization, Rome. Retrieved on 9 December 2019 from <http://www.fao.org/3/BA0059E/ba0059e.pdf>
- FAO. 2018. Fishery and Aquaculture Statistics. Global capture production 1950-2016 (FishstatJ). FAO Fisheries and Aquaculture Department [online]. Rome. Updated 2018. Retrieved on 3 March 2020 from www.fao.org/fishery/statistics/software/fishstatj/en
- Ferdouse, F., Holdt, S.L., Smith, R., Murúa, P., and Yang, Z. 2018. *The Global Status of Seaweed Production, Trade and Utilization –Volume 124*. Food and Agriculture Organization, Rome. 115 pp.
- Fernandez, P.R. 2009. “The Philippines: Governance and Management for a Complex Coastal Ecosystem.” *Environment* 51 (3): 38-51.
- Fidelman, P., Evans L., Foale, S., Weible, C., von Heland, F., and Elgin, D. 2014. “Coalition Cohesion for Regional Marine Governance: A Stakeholder Analysis of the Coral Triangle Initiative”. *Ocean and Coastal Management* 95, 117-128.
- Guterres, A. 2020. “A Time to Rescue the Sick and Save the Planet” *The New York Times*. Retrieved on 16 March 2020 from <https://www.nytimes.com/2020/04/28/opinion/coronavirus-climate-antonio-guterres.html>.
- Guerrero III, R.D. 2019. “Farmed tilapia production in the Philippines is declining: What has happened and what can be done.” *Philippine Journal of Science* 148 (2): xi-xv.
- IPCC. 2019. Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Retrieved on 16 March 2020 from https://www.ipcc.ch/site/assets/uploads/sites/3/2019/11/03_SROCC_SPM_FINAL.pdf
- Lewins, R. 2001. *Consensus Building and Natural Resource Management: A Review*. Centre for the Economics and Management of Aquatic Resources (CEMARE) Research Paper 157, Department of Economics, University of Portsmouth, United Kingdom. 48 pp.
- Le Tissier, M.D.A., Buddemeier, R., Parslow, J., Swaney, D.P., Crossland, C.J., Smith, S.V., Whyte, H.A.Y., Dennison, W.C., Hills, J.M. and Kremer, H.H. (eds). 2006. The role of the coastal ocean in the disturbed and undisturbed nutrient and carbon cycles - A management perspective. LOICZ, Geesthacht, Germany. Retrieved on 9 March 2020 from <http://www.oas.org/dsd/loiczgefversion.pdf>
- Malayang, B.S. 2004. “A model of water governance in the Philippines”. In: *Winning the Water War*. (eds. A.C. Rola et al.). Philippine Institute of Development Studies and Philippine Council of Agriculture, Fishery and Natural Resources Research and Development. pp. 59-84.
- Montefrio, M.J.F. and Dressler, W. 2016. “The green economy and constructions of the “idle” and “unproductive” uplands in the Philippines”. *World Development* 79: 114–126.
- Olin, P., Smith, J., Nabi, R. 2011. *Regional Review on Status and Trends in Aquaculture Development in North America: Canada and the United States of America- 2010*. FAO Fisheries and Aquaculture Circular No. 1061/2. Retrieved on 9 December 2019 from <http://www.fao.org/3/i2163e/i2163e00.pdf>
- Oracion, E.G.; Guino-o II, R.S. and Credo, J.A. 2015. *Income Changes in Household Beneficiaries of Small Water Impounding Facilities in Hinterland Communities*. Report Submitted to the Department of Environment and Natural

- Resources (DENR) through the Provincial Environment and Natural Resources Office (PENRO) of Negros Oriental. Research and Development Center, Silliman University. 32 pp.
- Ostrom, E. 2000. "Reformulating the commons". *Swiss Political Science Review* 6 (1): 25-52.
- PCCC. 2018. *Climate Change and the Philippines: Executive Brief*. Philippine Commission on Climate Change. Manila. 12 pp.
- Read, Q.D., Brown, S., Cuéllar, A.D., Finn, S.M., Gephart, J.A., Marston, L.T., Meyer, E., Weitz, K.A., and Muth, M.K. 2020. "Assessing the environmental impacts of halving food loss and waste along the food supply chain,." *Science of the Total Environment* 712: 1-11.
- Republic of the Philippines. 1993a. Executive Order No. 72. PROVIDING FOR THE PREPARATION AND IMPLEMENTATION OF THE COMPREHENSIVE LAND USE PLANS OF LOCAL GOVERNMENT UNITS PURSUANT TO THE LOCAL GOVERNMENT CODE OF 1991 AND OTHER PERTINENT LAWS.
- Republic of the Philippines. 1993b. Executive Order No. 124. ESTABLISHING PRIORITIES AND PROCEDURES IN EVALUATING AREAS PROPOSED FOR LAND CONVERSION IN REGIONAL AGRICULTURAL CENTERS/REGIONAL INDUSTRIAL CENTERS, TOURISM DEVELOPMENT AREAS AND SITES FOR SOCIALIZED HOUSING.
- Republic of the Philippines. 1993c. Memorandum Circular No. 54. PRESCRIBING THE GUIDELINES GOVERNING SECTION 20 OF RA 7160 OTHERWISE KNOWN AS THE LOCAL GOVERNMENT CODE OF 1991 AUTHORIZING CITIES AND MUNICIPALITIES TO RECLASSIFY AGRICULTURAL LANDS INTO NON-AGRICULTURAL USES.
- Republic of the Philippines. 1997. Republic Act 8435 (AN ACT PRESCRIBING URGENT RELATED MEASURES TO MODERNIZE THE AGRICULTURE AND FISHERIES SECTORS OF THE COUNTRY IN ORDER TO ENHANCE THEIR PROFITABILITY, AND PREPARE SAID SECTORS FOR THE CHALLENGES OF GLOBALIZATION THROUGH AN ADEQUATE, FOCUSED AND RATIONAL DELIVERY OF NECESSARY SUPPORT SERVICES, APPROPRIATING FUNDS THEREFOR AND FOR OTHER PURPOSES).
- Republic of the Philippines. 1998. Republic Act 8550 (AN ACT PROVIDING FOR THE DEVELOPMENT, MANAGEMENT AND CONSERVATION OF THE FISHERIES AND AQUATIC RESOURCES, INTEGRATING ALL LAWS PERTINENT THERETO, AND FOR OTHER PURPOSES).
- Republic of the Philippines. 2009. Republic Act 10000 (AN ACT PROVIDING FOR AN AGRICULTURE AND AGRARIAN REFORM CREDIT AND FINANCING SYSTEM THROUGH BANKING INSTITUTIONS).
- Republic of the Philippines. 2015. Republic Act 10654 (AN ACT TO PREVENT, DETER AND ELIMINATE ILLEGAL, UNREPORTED AND UNREGULATED FISHING, AMENDING REPUBLIC ACT NO. 8550, OTHERWISE KNOWN AS "THE PHILIPPINE FISHERIES CODE OF 1998", AND FOR OTHER PURPOSES).
- Rola, A.C., Francisco, H.A. and Liguton, J.P.T. (eds.) 2004. *Winning the Water War*. Philippine Institute of Development Studies and Philippine Council of Agriculture, Fishery and Natural Resources Research and Development. 291 pp.
- Shefat, S.H.T., Rahma, A., Chowdhury, Mohammed, A. and Uddin Md. N. 2018. "Strength, weakness, opportunities and threat analysis of integrated aqua-farming in Bangladesh." *Acta Scientific Agriculture* 2 (12), 112- 118.
- Song, A.M., Bower, S.D., Onyango, P., Cooke, S.J. and Chuenpagdee, R. 2017. "Inter-sectoral Governance of Inland Fisheries: Research Needs and Foci." In: *Inter-Sectoral Governance of Inland Fisheries*. (eds. Song, A.M. et al.). TBTI Publication Series, E-01/2017. Too Big To Ignore-WorldFish. St. John's, Canada. Pp. 1-17.
- SN USAID FRP. 2019. *South Negros USAID Fish Right Program Report*. Institute of Environmental and Marine Sciences, Silliman University, Dumaguete City.
- Velasco, L.R. and Cabanilla, L. 2003. *Assessment of physical resource capability in Philippine agriculture*. PASCN Discussion Paper No. 2003-03. 61 pp.
- Watts, J. 2018. "We have 12 years to limit climate change catastrophe, warns UN." Retrieved on 21 April 2020 from https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-unreport?fbclid=IwAR0ZnQmn82RPv3g5NAVeU4J_mTyG3YsPTC3bweXdGsE_WTBaX9SYV6kwCbo
- Weatherdon, L., Magnan, A., Rogers, A.D., Sumaila, U.R. and Cheung, W.W.L. 2016. "Observed and Projected Impacts of Climate Change on Marine Fisheries, Aquaculture, Coastal Tourism, and Human Health: An Update." *Frontiers in Marine Science* 3: 48. <https://doi.org/10.3389/fmars.2016.00048>.
- Zuccarello G.C., Critchley, A.T., Smith, J., Sieber, V., Lhonneur, G.B. 2006. "Systematics and genetic variation in commercial *Kappaphycus* and *Eucheuma* (Solieriaceae, Rhodophyta)." *Journal of Applied Phycology* 18: 643-651 doi: 10.1007/s10811-006-9066-2.