CHAPTER 20

Ensuring Ecological Integrity, Clean and Healthy Environment

The COVID-19 pandemic emphasized the importance of the environment and natural resources in providing our basic needs (food, clean water, and air) and even as a potential source of the cure for zoonotic diseases. The mobility restrictions imposed during the pandemic demonstrated how rapidly nature could recover and flourish. As a result, we saw temporary improvements in environmental quality and the overall condition of terrestrial and marine ecosystems, including ecotourism sites.

However, the improvements may be short-lived if not properly managed. The implementation of health protocols and rising digitalization have driven more resource use and waste generation. Mobility restrictions also hampered environmental monitoring, including site inspections, resource assessments, and wildlife and habitat patrolling activities. All these are threatening ecological integrity. Thus, the aim is to continue instituting reforms and implementing innovative actions and nature-based solutions to address these emerging issues under the new normal, along with the long-standing challenges on governance, monitoring, and evaluation that hamper the attainment of the sector's targets.

ASSESSMENT

SUSTAINING BIODIVERSITY AND ECOSYSTEM SERVICES

The ecosystem-based actions and area-based management measures implemented over the past years are starting to demonstrate improvements in our terrestrial and coastal and marine ecosystems. Policy reforms and the continued implementation of banner programs for the sector facilitated the achievement of majority of our targets to sustain biodiversity and ecosystem services. However, mobility restrictions and budget reprioritization due to the COVID-19 pandemic affected various management and monitoring activities, which led to underachievement of several sector targets.

Forest cover generally increased, but mobility restrictions and limited resources constrained watershed management and monitoring activities. Based on the latest land cover data reported by the National Mapping and Resource Information Authority (NAMRIA), the decade-long rehabilitation of degraded forest lands and strengthened protection activities for existing and rehabilitated forests continued to show positive results with the increase of forest cover from 7.0 million hectares (ha.) in 2015 to 7.2 million ha. in 2021. However, due to significant reduction in the budget for the implementation of forest rehabilitation and management activities, other related forestry targets were not achieved in 2021. In particular, denuded and degraded forest lands were reduced from 7.6 million ha. to only 7.1 million ha., falling short of the 6.8 million ha. target for 2021. Likewise, only 8.7 million ha. of forestlands were placed under effective management in 2021, which is still below the target of 9 million ha. On production and protection forests, a total of 3,523 kilometers (km) have been delineated in 2021, which is 4,142 kms lower than the target. Further, only 73 ha. have been planted with mangroves compared to the target of 329 haIn addition, there were delays in completing the management plans and monitoring wells for the targeted groundwater critical areas (i.e., Masbate and Laguna) and the comprehensive water assessments of major river basins (e.g., Cagayan De Oro River Basin) in 2021. This is because the field surveys and data gathering activities were impeded by mobility restrictions prompted by the pandemic. Nonetheless, the National Water Resources Board (NWRB) is continuously coordinating with concerned local government units (LGU) and stakeholders to gather needed data and information to ensure that the targets will be achieved by the end of the plan period. Furthermore, the NWRB ensures that there will be available personnel and equipment, such as spare sensors, during fieldwork activities to acquire the needed information.

Land titling and related land management activities were slowed down by pandemic-related physical distancing and travel restrictions. A total of 34,478 free patents (residential and agricultural) have been issued in 2021, which is significantly below the 67,000 target. This was partly because the Department of Environment and Natural Resources (DENR) through the Land Management Bureau (LMB) stopped accepting applications for Agricultural Free Patent (AFP) following the period limit set under RA 9176[1] until December 31, 2020. However, DENR-LMB is expected to resume accepting applications for AFP with the effectivity of the Implementing Rules and Regulations of RA 11573[2] by 2022.

Similarly, only seven Certificate of Ancestral Domain Titles (CADTs) were issued, falling below the 2021 target of 12 CADTs. This is attributed to the limited movement of field personnel and observance of physical distancing and other health protocols, which hindered the conduct of surveys, inspections, and consultations with the community. On the other hand, 11 Ancestral Domain Sustainable Development and Protection Plans (ADSDPPs) have been formulated. This exceeded the 2021 target of six ADSDPPs prepared as it included those from the previous years but were only completed in 2021.

The implementation of responsible mining policies and programs yielded positive results. Mining application and approval processes have been streamlined. As a result, the declared *Minahang Bayan* increased to 94 percent, exceeding the 2021 target of 90 percent. Likewise, the 72.5 percent target of rehabilitating the abandoned Palawan Quicksilver Mine Phase 2 was met. Rehabilitation activities

[1] An Act Extending the Period Until December 31, 2020 for the Filing of Applications for Administrative Legalization (Free Patent) and Judicial Confirmation of Imperfect and Incomplete Titles to Alienable and Disposable Lands of the Public Domain, Amending

[2] An Act Improving the Confirmation Process for Imperfect Land Titles, Amending for the Purpose Commonwealth Act No. 141, as Amended, Otherwise Known as "The Public Land Act", and Presidential Decree No. 1529, as Amended, Otherwise Known As The "Property Registration Decree"

undertaken included the control and management of the mercury-contaminated pit lake through phytostabilization using forest tree species with high heavy metal accumulation potential, phytoremediation measures, and continuous maintenance of various organic filter media. The DENR issued new policies and instruments to revitalize the mining industry, including the guidelines on streamlining the approval processes for the issuance of permits for the cutting, removal, and relocation of naturally-growing trees,[3] Safety and Health, Environment, and Social Development and Management (SHES) Manual,[4] and additional measures and mechanisms for strict implementation and compliance with mine safety and health, environmental, and social development policies.[5] However, only 64 percent of surface metallic mines were reported to be compliant with the SHES-approved work programs[6] as some surface metallic mines are currently inactive or undergoing the Care and Maintenance Program (CMP).

The coverage of the country's terrestrial and marine protected areas increased, and their management has been strengthened. The Expanded National Integrated Protected Areas System (ENIPAS) Act (RA 11038, amending RA 7586) legislated an additional 94 national protected areas (PAs). As a result, the country now has 244 PAs covering an area of 7.8 million ha. These 244 PAs are equivalent to 15.4 percent (4.6 million ha.) of the Philippine land area and 1.4 percent (3.1 million ha.) of our territorial waters and exclusive economic zone (EEZ), contributing to the achievement of our commitments under the Sustainable Development Goals (SDG) and Convention on Biological Diversity (CBD).[7]

Aside from increasing the coverage of PAs, the ENIPAS Act also provided enabling mechanisms to manage these PAs effectively. Pursuant to this law, a total of 178 Protected Area Management Boards (PAMB) have been established and operationalized to administer PAs. Moreover, 87 clustered Protected Area Management Offices (PAMO) have been set up to manage the day-to-day activities in the PAs, with support from 3,133 staff. Protected Area Management Plans (PAMPs) have also been formulated in 199 PAs to serve as the long-term framework plans for managing these and guide in preparing annual operations plans and budgets.

There is an overall improvement in the management of our terrestrial protected areas covering 1,656,353 ha. Based on the Management Effectiveness Tracking Tool (METT),[8] there are no more PAs with poor management status in 2021. On the other hand: (a) 73,776 ha. are under fair management; (b) 1,251,083 ha. are under good management; and (c) 331,493 ha. are under excellent management. Moreover, the METT indicates that of the 2,726,714.27 ha. of marine protected areas (MPA) being monitored: (a) none fell under poor management effectiveness category; (b) 460,680 ha. are under fair management; (c) 1,064,906 ha. are under good management; and (d) 1,201,129 hectares are assessed to be under excellent management.

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[3] DENR Administrative Order (DAO) No. 2021-11

[4] MGB Memorandum Circular (MC) No. 2021-00

[5] DAO No. 2021-25

[6] DAO No. 2021-25

[7] This will contribute to the achievement of SDG Target 14.5 and Aichi Target 11 under the CBD, and its forthcoming post-2020 biodiversity framework and corresponding targets

[8] Pursuant to the DENR-BMB Technical Bulletin No. 2018-05, METT is used to assess and monitor the management effectiveness of protected areas, particularly those under the NIPAS. Management effectiveness reflects the design issues relating to protected areas, adequacy and appropriateness of management systems and processes, and delivery of protected area objectives including conservation values. The evaluation of management effectiveness involves the assessment of how well the protected area is being managed – primarily the extent to which it is protecting its ecosystem values and achieving goals and objectives. The METT is a tool accomplished by PAMB members, and based on their responses, the average score are computed and the rating denotes the following: a) 75-100% is excellent; b) 51-74% is good; c) 26-50% is fair; and d) <26% is poor.

The percentage of hard coral[9] and seagrass cover in national MPAs and other priority coastal and marine conservation areas generally improved. Out of the 36 MPAs being monitored: (a) seven MPAs have poor hard coral cover (0-22% hard coral cover) in 2021, vis-a-vis the target of nine MPAs under poor hard coral cover category; (b) 10 have fair hard coral cover (>22-33% hard coral cover) which is the target number of MPAs under this category; (c) six MPAs are classified under good category (>33-44% hard coral cover), lower than the target of 10 MPAs; and (d) 13 MPAs are under the excellent category (>44% hard coral cover) exceeding the target of seven 7 MPAs. Despite the unachieved target number of MPAs under good hard coral cover, there was an overall improvement in the status of coral reefs across the MPAs monitored under this indicator. Baselining activities for all the MPAs covered have also been completed this year.

Similarly, seagrass cover improved in these MPAs. Based on data as of the 4th quarter of 2021: (a) there are only 10 MPAs under poor seagrass cover (0-25%), lower than the target of 17 MPAs under this category for 2021; (b) 12 MPAs have fair seagrass cover (26-50%), achieving its target for 2021; (c) 12 MPAs have good seagrass cover (51-75%), exceeding the target of five MPAs; and (d) two MPAs have excellent seagrass cover (76-100%).

These accomplishments may be attributed to the limited disturbance to our ecosystems due to mobility restrictions as well as the continuous implementation of relevant programs (i.e., Coastal and Marine Ecosystems Management Program [CMEMP], Protected Area Development and Management Program), which strategically focused on the national terrestrial and marine protected areas and other priority conservation areas in the country. Nonetheless, the remaining baselining activities need to be fast-tracked to better inform planning and programming for the sector.

Delineation of municipal waters and establishment of Community Fish Landing Centers (CFLCs) have been continuously pursued. However, operationalization is constrained by logistics and other concerns related to national government and LGU arrangements. NAMRIA provided technical assistance in the delineation of the municipal waters of 80 coastal municipalities/cities in 2021, which will contribute to ensuring the preferential access of municipal fisherfolk to their coastal and marine resources. However, certifying and adopting such delineation through a local ordinance remains a problem due to disagreements on technical descriptions and boundary conflicts, particularly between and among adjacent/neighboring LGUs. Moreover, we have yet to delineate the municipal waters of LGUs with offshore islands pending the issuance of guidelines from the Department of Agriculture (DA) on this matter.

To reduce post-harvest losses and sustain livelihood opportunities, the DA-Bureau of Fisheries and Aquatic Resources (DA-BFAR) established 686 CFLCs in 2021, which is slightly lower than the target of 725 units. The underachievement of the target can be attributed to the delays in the delivery of construction materials due to mobility restrictions arising from the COVID-19 pandemic. Only 61.7 percent of the new and existing CFLCs have been operationalized in 2021, falling short of the 95 percent operationalization

[9] Hard corals, or scleractinian and stony coral are those that produce a rigid skeleton made of calcium carbonate (CaCO3). Hard corals are the building blocks of coral reefs, as the skeletons left behind by these hard corals accumulate and are cemented by coralline algae to form coral reefs (Licuanan, 2020). In contrast, soft corals, or Alcyonacea and ahermatypic coral, do not produce a rigid calcium carbonate skeleton and do not form reefs. We monitor the percent of hard coral cover in our marine protected areas under the NIPAS following the DENR Technical Bulletin No. 2019-04 (Technical Guide on Biodiversity Assessment and Monitoring System for Coastal and Marine Ecosystems).

target. Some CFLCs are unable to operate because of lack of water and electricity connections, which is usually the LGUs' counterpart contribution. Most of the CFLCs established are also still finalizing their Manual of Operations and corresponding municipal ordinances.

IMPROVING ENVIRONMENTAL QUALITY

While the pandemic-related restrictions resulted in improvements in environmental quality, the challenge is to sustain such improvements. Hence, existing measures need to be scaled up to improve the capacities of LGUs to implement the devolved environment and natural resources (ENR) functions. Innovative solutions are also key to adapting to the new normal.

Air quality assessment could not be completed because of monitoring issues. The obsolescence and poor maintenance of monitoring instruments remain a significant bottleneck in delivering timely and accurate information. The imposition of mobility restrictions also compounded this problem by hampering regular maintenance of air quality monitoring stations. This resulted in huge data gaps, which explain the lower accomplishments in 2020 compared to 2021 (Table 20.1).

Nonetheless, the gradual reopening of the economy and easing of restrictions in 2021 allowed the DENR to accelerate the maintenance and monitoring operations for air and water quality. In 2021, only 11 of the 38 highly-urbanized cities (HUC) and major urban areas monitored for ambient air quality met the 75 percent data capture requirement for determining air pollution levels.[10] All these 11 HUCs met the ambient air quality guidelines for PM10 and PM2.5. This can be attributed to the continuous enforcement of air quality standards through the Industrial Emission Management and Motor Vehicle Emission Management Programs.

Priority water bodies have yet to meet acceptable conditions for their intended use. All the monitored water bodies for public water supply and food production met the guideline values for all water quality parameters[11] except for fecal coliform.[12] High levels of fecal coliform can be attributed to inadequate wastewater treatment facilities for point sources (i.e., domestic)[13] and insufficient measures to address pollution from non-point sources (i.e., agricultural runoff).[14] In 2021, water quality in monitored recreational waters did not improve compared with the previous years. On a quarterly basis, improvements were observed due to the imposition of strict guidelines regulating tourism activities in island and beach destinations under community quarantine.[15]

Despite the effort to improve the compliance with the Ecological Solid Waste Management Act (RA 9003), achieving the solid waste management (SWM) targets remains difficult. The 2021 Solid Waste Diversion Rate (SWDR) accomplishment for LGUs within (54%) and outside Metro Manila (72%) increased but fell short of the target (75%) due to the lack of available waste diversion technologies and infrastructure and insufficient capacity to conduct compliance monitoring.[16]

[10] Data capture only covers the January to June 2021 period
[11] Dissolved oxygen, biological oxygen demand, Phosphate, temperature, total suspended solids, acidity
[12] To be considered as "passed," water bodies must meet the guideline values for all parameters.
[13] Point-source pollution refers to pollution originating from a single, identifiable source.
[14] Nonpoint-source pollution refers to pollution that does not originate from a single source or point.
[15] Declared under the IATF Omnibus Guidelines on the Implementation of Community Quarantine and reiterated by the Department of Tourism through Memorandum Circular No. 2020-007 or "The New Normal Health and Safety Guidelines for Island and Beach Destinations"
[16] The SWDR accomplishment outside Metro Manila is based on the average SWDR targets of approved SWMPs for a given year, not the actual solid waste diversion.

Management of healthcare wastes has improved. This improvement can be attributed to the unhampered healthcare waste management operations amid the pandemic and increased number of Treatment, Storage, and Disposal (TSD) facilities that handle infectious wastes. The enabling factors include: (a) exempting infectious waste transporters from the travel ban imposed during the community quarantine period; (b) issuing the guidelines to simplify permitting requirements and procedures for waste transporters and TSD facilities; and (c) immediately shifting to online permitting system for continuous and contactless accreditation during the pandemic.

Land degradation hotspots decreased while targets for soil fertility assessment and mapping were unmet because of logistical challenges. In 2021, the area of land degradation hotspots decreased to 1,910,478 ha., exceeding the target reduction of 2,050,000 ha. This was facilitated through the close coordination of DA Central and Regional Field Offices as well as the continuous implementation of several policies and programs (e.g., Designation of Bureau of Soil and Water Management [BSWM] as Focal Office of Irrigation Network Services on Small Scale Irrigation Projects [SSIPS], Sustainable Corn Production in Sloping Areas [SCoPSA], Integrated Upland Conservation Guided Farm [IUCGF], National Organic Agriculture Program, and Watershed Rehabilitation/Restoration under the Manila Bay Clean-up, Rehabilitation, and Restoration under the Supreme Court Mandamus).

On the other hand, only 184,000 ha. were assessed and mapped for soil fertility status, which is lower than the 2021 target of 450,000 ha. This underachievement can be attributed to the delays in field survey and sampling activities due to inclement weather conditions, inaccessibility/lack of access roads, unstable peace and order situations, and the mobility restrictions due to the COVID-19 pandemic.

Shift to more sustainable consumption and production patterns has been demonstrated. According to the Philippine Center for Environmental Protection and Sustainable Development, Inc. (PCEPSDI), the number of eco-labeled products increased from 75 in 2020 to 79 in 2021 with the granting of Seals of Approval for Food Service Establishments to four restaurants. This was facilitated through consistent support from the food service industry. Consumers' increasing awareness and demand for eco-labeled products and services signify a shift to more sustainable consumption and production patterns.

INCREASING RESILIENCE OF COMMUNITIES AND THEIR LIVELIHOOD

The adaptive capacities of local governments to develop risk-informed plans are slowly building up. However, early warning systems (EWS) and disaster preparedness could not be wholly assessed due to insufficient data. Regarding employment from ecotourism and sustainable resource-based industries, the community quarantines and redirection of budgets due to the COVID-19 pandemic reduced employment and income opportunities of resource-dependent families and communities.

Local planning capacities to address climate change and disaster risks are improving. Continuing technical assistance by the Department of Human Settlements and Urban Development (DHSUD), Department of the Interior and Local Government (DILG), and Climate Change Commission (CCC) contributed to the increase in the number of LGUs with Local Climate Change Action Plans (LCCAP) and climate change (CC) and disaster risk reduction (DRR)-enhanced comprehensive Land Use Plans (CLUP) and Comprehensive Development Plans (CDP). An updated set of guidelines on the assessment of CDPs

was also adopted in March 2021[17] includes parameters to determine if the CDPs address the climate and disaster risks present in the locality. The number of LGUs with updated Local Disaster Risk Reduction and Management Plans (LDRRMP) increased in 2021 but still fell short of the target with only 63 percent reviewed. This underachievement is attributed to the low submission rate of LGUs. This is an important issue that needs to be addressed, considering that the annual OCD review and certification of the LDRRMP is a requirement for utilizing the Local Disaster Risk Reduction and Management Fund (LDRRMF).

Improvements in local capacities for risk preparedness could not be entirely assessed. Due to the ongoing health crisis, the CY2021 Seal of Good Local Governance (SGLG) assessment activities have been suspended. With this comes the challenge of assessing the progress made by LGUs in adopting EWS and establishing functional DRRM operation centers as data on these indicators are sourced from the SGLG. The DILG is improving the SGLG assessment criteria to ensure that the indicators are comprehensive and inclusive. These improvements include developing and communicating standard operating procedures (SOP) on the end-to-end use of EWS, including feedback mechanisms, to residents in high-risk areas.[18]

Employment from ecotourism and sustainable resource-based industries decreased significantly. PAs provide the natural resource base for ecotourism. In fact, 95 out of the 244 national PAs have been developed for ecotourism. However, as many ecotourism activities have been discontinued, only 57 out of these 95 PAs are open for local visitors/tourists as of the third quarter of 2021. This downturn in ecotourism activities reduced the income generated from our PAs from PHP136,968,158 in 2019 to only PHP10,283,769 in 2021. Nevertheless, 3,272 people were employed in ecotourism/farm tourism sites in 2021, which is slightly higher than the 3,230 people employed in 2020.

In contrast, only 208,959 people were employed in reforestation and non-timber/agroforestry enterprises (i.e., National Greening Program [NGP], Community Based Forest Management [CBFM]) as of September 2021, which is lower compared to the 367,195 people employed in 2020. Aside from the pandemic restrictions, this decrease may be attributed to the budget cut for the Enhanced National Greening Program (ENGP), which reduced the target areas to be planted, thereby reducing the number of persons to be employed for the implementation of the program.

[17] DILG Memorandum Circular 2021-037: Updated Guidelines on the Assessment of CDPs of Cities and Municipalities
[18] DILG Memorandum Circular 2022-026. Source: https://www.dilg.gov.ph/PDF_File/issuances/memo_circulars/dilg-memocircular-202234_36cff3f3d4.pdf

IN FOCUS:
THE ORDINARIOS, FAMILY LIVING BY THE SEA'S GOOD GRACES

The Ordinarios are a family of six living along the coast of Loreto, Dinagat Islands. Mr. Ordinario is a deputized 'Bantay Dagat' and boat operator, while his wife is a fish vendor and gleaner who collects shells, sea cucumbers, urchins, seaweed, and fish along the shore.

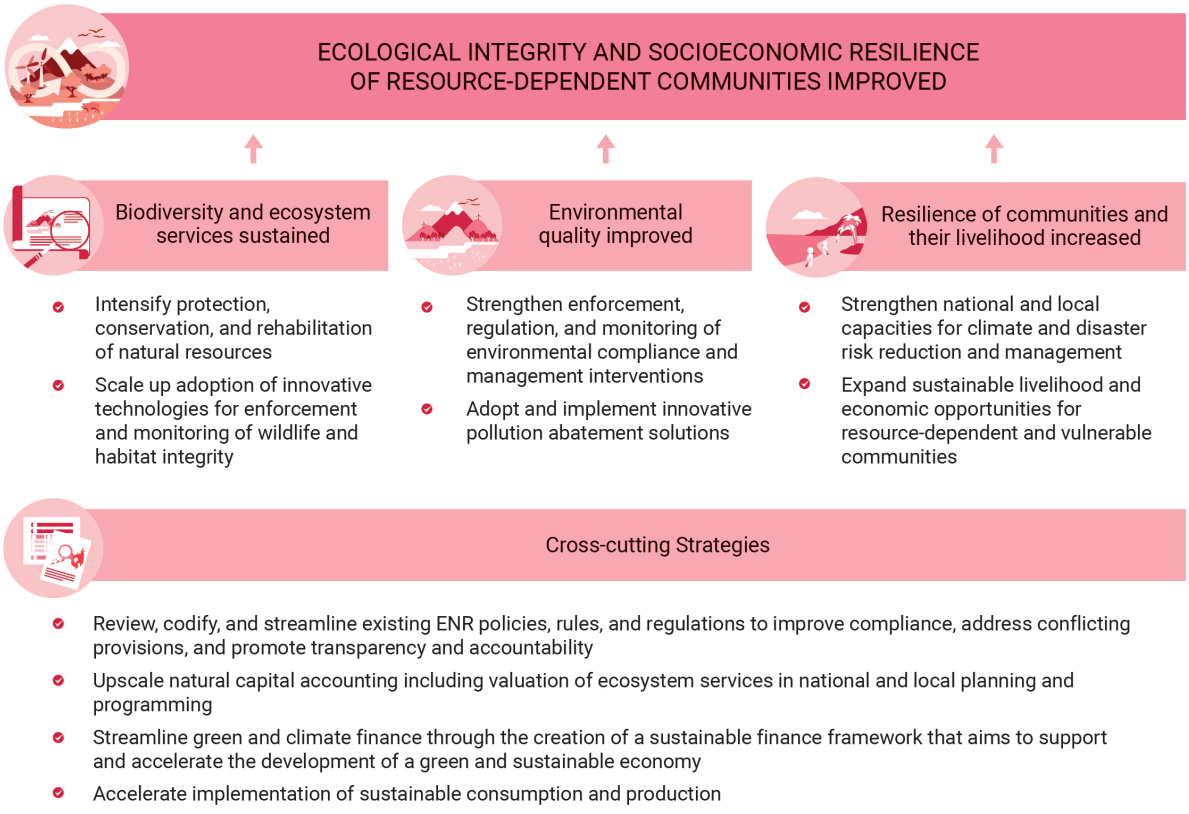
Like most parents, Mr. and Mrs. Ordinario aspire for a stable, comfortable, healthy, and secure life for their family. They strive to earn enough for their daily needs, unexpected expenses, and their children's education. Furthermore, they hope that someday, their children can graduate from college and secure decent jobs. However, the Ordinario family faces challenges that prevent them from attaining their goals. Mr. Ordinario's workdays as a boat operator have been reduced following the decline in tourism activities due to the pandemic. Similarly, Mrs. Ordinario's working hours were further reduced by the need to attend to the schooling requirements of her children, given the shift to online and modular learning. These changes resulted in reduced income for the family. The Ordinario family also bears the brunt of the continuing degradation of the surrounding upland and coastal and marine ecosystems. Fish catch, in particular, has been declining because of habitat degradation. A nearby mining operation, illegal fishing, and warming ocean temperatures have been causing coastal pollution. Natural hazards, such as typhoons, have also been exacerbating the risk of flooding in low-lying areas due to the continuous destruction of upland forests. Environmental issues such as these pose a constant and ever-looming threat to the lives and livelihood of the Ordinario family and others like them.

STRATEGIC FRAMEWORK

The Ordinario family represents the many resource-dependent and vulnerable families in the country whose livelihoods are threatened by continued degradation of natural resources and declining quality of the environment further compounded by the negative impacts of climate change. With the COVID-19 pandemic, addressing these environmental problems became even more challenging because of the mobility restrictions and implementation of minimum health standards which resulted in: (a) limited patrolling, policing, and monitoring activities of wildlife habitats; (b) generation of more healthcare and household wastes; (c) elevated level of natural resource extraction; and (d) increased vulnerability of communities to economic and social impacts of the pandemic, among others.

To address the increasing challenges and threats faced by the Ordinario Family and many other communities depending on our natural resources, the government will continue to prioritize ensuring ecological integrity. This can be done by intensifying the protection, conservation, and rehabilitation of natural resources and accelerate the adoption of innovative technologies for enforcement and monitoring of wildlife and habitat. Enforcement of environmental laws will also be further strengthened, along with the adoption of innovative waste and pollution abatement measures to address the increasing waste and other pollutants generated by, among others, COVID-19 response measures. The capacities of resource-dependent communities to undertake climate change adaptation and mitigation and disaster risk reduction and management (CCAM)-DRRM actions will likewise be strengthened and economic opportunities from natural capital expanded. New strategies to address potential shocks and other uncertainties that may affect the attainment of the sectoral targets will also be pursued.

Figure 20.1. Strategic Framework to Ensure Ecological Integrity, Clean and Healthy Environment



STRATEGIES

TO SUSTAIN BIODIVERSITY AND ECOSYSTEM SERVICES

Intensify protection, conservation, and rehabilitation of natural resources. In view of the forthcoming implementation of the Mandanas-Garcia ruling by 2022 and pursuant to Executive Order No. 138,[19] the National Government Agencies (NGAs) with devolved functions and services to the LGUs are directed to prepare their respective DTPs. These plans shall guide the LGUs in programming the increased financial resources arising from the ruling as they fully assume the devolved roles and responsibilities under the Local Government Code (RA 7160). The effective implementation of these DTPs is critical to ensure effective NG-LGU co-management of natural resources.

Under the DTP of the DENR, LGUs are expected to oversee the implementation of community-based forestry projects, manage and control communal forests (i.e., those with areas not exceeding 50 km^2), and establish tree parks, greenbelts, and similar development projects. The LGUs will also manage community watersheds and undertake a joint assessment, profiling, evaluation, and formulation of management plans for these watersheds, explore payment for ecosystem services for the uses of water, and identify other related protection activities.

Meanwhile, under the DTP of the DA, LGUs are expected to fully oversee the management of their municipal waters and provide support services and assistance to the municipal fisherfolk (e.g., technology and research, credit, production and marketing, training for additional/supplementary livelihood). LGUs will also be assisted in managing the protected areas, refugia, and/or sanctuaries under their jurisdiction and ensuring effective implementation of ecosystem-based management approaches to sustain and optimize the benefits that can be derived from natural resources.

Scale up adoption of innovative technologies for enforcement and monitoring of wildlife. Relevant agencies (e.g., DENR, DILG, Department of Information and Communications Technology [DICT], Department of Science and Technology [DOST], and Philippine Space Agency [PhilSA]) will maximize the use of internet of things (IoT) or system of interrelated devices to monitor the state of ENR. Remote sensing technologies (e.g., RADAR, LiDAR, spectrometers, and radiometers) and *in-situ* monitoring devices will collect real-time data on wildlife and other ecosystem parameters, including illegal activities. These agencies will collect and process the data within the IoT ecosystem and use these to inform planning and policy towards the sustainable utilization of natural resources.

Strengthen enforcement and monitoring of compliance of mining operations with relevant laws and regulations. To enforce relevant laws, policies, and regulations on mining, the MGB will develop more stringent monitoring tools to assess the compliance of mines under exploration, production, and care and maintenance. The MGB shall also improve its policy enforcement by ensuring that mining companies are only allowed to operate once they have successfully satisfied the conditions provided in their respective mining permits and contracts.

[19] Executive Order 138, s 2021 Full Devolution of Certain Function of the Executive Branch to Local Governments, Creation of a Committee on Devolution, and for Other Purposes

Further, the MGB shall strengthen regulatory enforcement by improving coordination with local governments. Moreover, transparency and accountability in the management of minerals shall be improved with more mining companies enjoined to participate and cooperate in the Philippine Extractive Industries Transparency Initiative (PH-EITI) process. This entails the submission and consolidation of required disclosures (e.g., data on production, tax collection, and revenue utilization) for public dissemination. The MGB will also develop and implement new policies and guidelines to ensure that mining-related plans and programs are aligned with local land use and development plans to maximize development impacts.

Continuously collect data by establishing surface water and groundwater monitoring stations and up-to-date water resources assessment to support decision and policy making. Water sustainability and security cannot be properly determined without updated and reliable data and information on water resources (e.g., supply and demand analysis, water balance). The DENR, through MGB and NWRB, and River Basin Control Office (RBCO) will update existing water information, establish additional groundwater and surface water monitoring stations, and enhance capacity on water resource assessment and on the use of new and innovative technologies that will enable the collection of real-time or up-to-date water data and information. These strategies will facilitate a more results- and science-based decision and policy making towards effective water resource management in the country.

TO IMPROVE ENVIRONMENTAL QUALITY

Upgrade monitoring systems and capacitate the government to enhance environmental regulatory enforcement and compliance. There shall be investments in advanced and state-of-the-art technologies (e.g., remote sensing and uncrewed aerial vehicles) and innovative systems and processes to heighten the enforcement of environmental laws and regulations and environmental quality monitoring. The DENR will explore the outsourcing of operation, maintenance, and calibration services for continuous ambient air quality monitoring stations using the Air Quality Management Fund. The DENR will also enjoin the participation of the private sector under its Adopt a Continuous Ambient Air Quality Monitoring Station (CAAQMS) Program to expand the air quality monitoring network. To bolster the regulation of point and non-point sources of water pollution, the DENR shall likewise upgrade and establish more ambient water quality stations and enhance existing capacities for environmental testing.

In anticipation of the full devolution of national government functions pursuant to EO 138, s. 2021, the DENR will enhance its support for LGUs in the formulation/updating and implementation of their 10-year solid waste management plans. Along with this, the DENR shall also prioritize improving its monitoring and enforcement capacities to ensure compliance of LGUs with the Ecological Solid Waste Management Act. With COVID-19 expected to persist, DENR shall also provide continuous support to LGUs to establish additional TSD facilities handling infectious wastes and expand service coverage to connect rural and remote areas.

Adopt and implement innovative pollution abatement solutions. The government shall invest in more environment-friendly transportation systems and technologies to facilitate the modal shift from private vehicles, which are the major sources of air pollution.[20] There will be more public investments in

[20] Based on the latest emission inventory conducted by DENR in 2018, mobile sources accounted for 73.69 percent of total emissions. Source: https://air.

green infrastructure, open urban spaces, and wastewater treatment facilities (*see Chapter 19*). Similarly, NGAs, particularly the DOST, Department of Trade and Industry (DTI), CCC, and Department of Labor and Employment (DOLE), will strengthen or create incentives for adopting cleaner production technologies and processes (*see Chapters 8 and 9*). These include fast-tracking the development and implementation of green jobs assessment and certification guidelines.

TO INCREASE THE RESILIENCE OF COMMUNITIES AND THEIR LIVELIHOOD

Strengthen national and local capacities for climate and disaster risk reduction and management. The government shall secure funds for activities to build or strengthen local capabilities to: (a) formulate or update local development and land-use plans using up-to-date downscaled climate change projections;[21] (b) scale up the adoption of probabilistic multi-hazard early warning systems; (c) implement ecosystem-based adaptation measures (e.g., use of drought-tolerant crops and climate-adjusted cropping patterns); (d) access risk financing and risk transfer mechanisms; and (e) develop bankable climate change adaptation projects. The government will also provide continuous support for livelihood diversification to resource-dependent upland and lowland communities to ensure their socioeconomic resilience against multidimensional risks. To complement these strategies, the support of Congress will be needed for the replenishment of the People's Survival Fund (PSF) to meet the expected increase in demand from LGUs and local communities. External sources will likewise be explored and mobilized to augment the PSF.

The RBCO will strengthen real-time hydro-meteorological monitoring and watershed instrumentation programs to support climate change adaptation actions and improve flood risk management. This will be further supported by the operationalization of the National Climate Risk Management Framework, which establishes a harmonized, science- and risk-based system that will improve the country's overall capacity to address the threats of climate change.

Implement the Philippines' Nationally Determined Contributions (NDC). The government will prioritize support for and will invest in operationalizing the policies and measures (PAM) under the country's NDC, particularly in the agriculture, wastes, industry, transport, and energy sectors.

Expand sustainable livelihood and economic opportunities for resource dependent and vulnerable communities. As travel and quarantine restrictions related to the COVID-19 pandemic are relaxed, actions to ensure the safe reopening of ecotourism sites to domestic and international tourists will be undertaken. These will be enabled by the new and updated plans and policies of the government that provide targeted support to resource-dependent communities and peoples' organizations toward sustainable livelihood opportunities as well as biodiversity-friendly enterprises. These include the Updated Tourism Response and Recovery Plan, Reformulated National Tourism Development Plan 2021-2022, Updated Farm Tourism Strategic Action Plan 2021-2023, National Ecotourism Strategy and Action Plan 2021-2022, New Normal/Updated Operational Guidelines and Health and Safety Protocols, Enhanced NGP, and Coastal and marine Ecosystems Management Program (CMEMP).

emb.gov.ph/emission-inventory-2018/

[21] Based on the 6th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)

CROSS-CUTTING STRATEGIES

Promote sustainable and green finance in line with the Sustainable Finance Roadmap and Guiding Principles. This entails, among others, the development of: (a) innovative schemes to de-risk investments and capacity building for financial regulators and market participants on internalizing environmental and climate and disaster risks; (b) a database or pipeline of sustainable projects for the public and private sectors; and (c) a system to track sustainable finance flows and assess its contribution to the attainment of NDC targets, sustainable development commitments, and PDP outcomes.

Review, codify, and streamline existing ENR policies, rules, and regulations, to improve compliance, address conflicting provisions, and promote transparency and accountability. The DENR shall prioritize the codification and streamlining of existing ENR policies, including the conduct of assessment of the agency's mandates vis-a-vis its current institutional capacities (e.g., manpower complement, technical capabilities). These activities will address the overlaps in existing policies and improve service delivery with the end-view of strengthening overall ENR management.

Ensure just transition of workers affected by the structural change towards a greener, more sustainable, and low carbon economy. Support for the implementation of the green jobs human resource development plan will be prioritized. This includes the provision of support measures and training opportunities (e.g., retooling, upskilling, or reskilling on sustainable practices/processes) for workers and enterprises affected by the transition to a sustainable and green economy.

Accelerate implementation of sustainable consumption and production (SCP). To facilitate green recovery and drive resilient and inclusive economic growth, specific actions espoused in the Philippine Action Plan for Sustainable Consumption and Production (PAP4SCP) will be implemented along the nodes of: (a) policy and regulation; (b) Research and Development (R&D), innovation, and technology; (c) infrastructure; and (d) promotion and education. In particular, actions that will not only promote SCP but also contribute to the transition to a more circular economy will be pursued, such as through: (a) undertaking life cycle assessments (LCA) to evaluate the environmental impacts throughout a product's entire life cycle from cradle to cradle (i.e., from the extraction of resources to manufacture and use of the product until its recycling into a new product at end-of-life, resulting in zero waste); (b) developing and adopting innovative technologies that can minimize input requirements and utilize secondary raw materials or recycled materials for production; (c) pursuing *choice-editing* (e.g., addressing single-use plastics and unsustainable packaging) and *choice-influencing* (e.g., establishment of sustainable mobility solutions) strategies to steer behavioral change; and (d) strengthening the National Ecolabelling Program and other green certification schemes to increase preference for green/sustainable products and services. (e.g., establishment of sustainable mobility solutions) strategies to steer behavioral change.

The foregoing priorities will be complemented by actions that aim to ensure evidence-based management of ENR through: (a) institutionalization of natural capital accounting (NCA); (b) conduct of carrying capacity and assimilating capacity assessments; and determination of maximum sustainable yield/reference points and other parameters towards sustainable use of natural resources; and (c) adoption of spatial approach in development planning.

RESULTS MATRIX

Table 20.1 Ecological Integrity, Clean and Healthy Environment Ensured

INDICATOR	BASELINE (YEAR)	TARGETS			ACTUAL		
		2020	2021	2022	2019	2020	2021
Chapter Outcome: Ecological integrity and socioeconomic resilience of resource-dependent communities improved							
Subsector Outcome 1: Biodiversity and ecosystem services sustained							
Forest cover increased (in million ha.)	7.01 (2015)	Increasing	Increasing	Increasing	7.04	7.16	7.18
Number of free patents issued	57,822 (2016)	62,000	67,000	72,000	51,939	48,802	34,478
Quality of coastal and marine habitats under NIPAS marine protected areas and other priority coastal and marine conservation areas improved							
Percentage of hard coral cover (HCC) in MPAs (number of MPAs)							
No baseline data	2 (2018)	0	0	0	2	1	0
Poor (0-22%)	12 (2018)	14	9	6	11	11	7
Fair (>22-33%)	11 (2018)	11	10	12	12	13	10
Good (>33-44%)	4 (2018)	4	10	10	4	3	6
Excellent (>44%)	7 (2018)	7	7	8	7	8	13
Percentage of seagrass cover in MPAs (number of MPAs)							
No baseline data	11 (2018)	0	0	0	6	6	0
Poor (0-25%)	11 (2018)	22	17	15	11	11	10
Fair (26-50%)	10 (2018)	10	12	11	12	12	12
Good (51-75%)	3 (2018)	3	5	7	6	6	12
Excellent (76-100%)	1 (2018)	1	2	3	1	1	2
Subsector Outcome 2: Environmental quality improved							
Percentage of priority water bodies within water quality guidelines increased (e.g., BOD, DO, pH, temperature, P, TSS, fecal coliform)							
Public water supply (%)	0 (2016)	Increasing	Increasing	Increasing	0	0	0
Food production (%)	20 (2016)	Increasing	Increasing	Increasing	10	0	0
Recreational (%)	87 (2016)	Increasing	Increasing	Increasing	53	33	33
Percentage of highly urbanized and other major urban centers within ambient air quality guideline value (i.e., PM10 and PM2.5) increased (%)	55 (2016)	Increasing	Increasing	Increasing	39	24	29
Solid waste diversion rate increased (%)							
Metro Manila	48 (2015)	70	75	80	44	47	54
Outside Metro Manila	46 (2015)				69	68	72

INDICATOR	BASELINE (YEAR)	TARGETS			ACTUAL		
		2020	2021	2022	2019	2020	2021
Percentage of healthcare wastes managed (%)	66 (2016)	100	100	100	Not Applicable[a]	92	97
Area assessed and mapped for soil fertility status and soil fertility management increased (ha)	1,000,000 (2016)	450,000	450,000	450,000	138,520	56,610	184,030
Area of land degradation hotspots decreased (ha, cumulative)	2,300,000 (2016)	2,100,000	2,050,000	2,000,000	2,047,175	1,913,832	1,910,478
Subsector Outcome 3: Resilience of communities and their livelihood increased							
Percentage of LGUs with climate change and disaster risk-informed plans increased (%)							
CLUP (%)	34 (2016)	Increasing	Increasing	Increasing	52	55	59
CDP (%)	0 (2016)	Increasing	Increasing	Increasing	Data are unavailable[b]		16
LCCAP (%)[c]	0 (2016)	74	75	100	0	0	41
LDRRMP (%)	0 (2016)	100	100	100	65	55	63
Number of LGUs with operating early warning systems in place increased	1,180 (2016)	Increasing	Increasing	Increasing	1,368	Data are unavailable[d]	
Number of fully-functional DRRM operation centers increased							
Permanent	775 (2016)	Increasing	Increasing	Increasing	890	Data are unavailable[d]	
Temporary	810 (2016)	Increasing	Increasing	Increasing	789		
Employment from biodiversity-friendly enterprises and other sustainable resource-based industries increased (cumulative)							
From NIPAS-PAs and ecotourism sites	1,484 (2016)	Increasing	Increasing	Increasing	2,956	3,230	3,272
From reforestation and non-timber/agroforestry enterprises (i.e.,NGP, CBFM)	114,584 (2016)	Increasing	Increasing	Increasing	278,052	367,195	208,959

Note: Targets were set before the pandemic and revisited in the midterm update. The 2020, 2021, 2022, and end-of-plan targets for LCCAP and LDRRMP, in particular, were revised to consider changes in priorities due to COVID-19.

a The indicator was recently added in the updated PDP 2017-2022 to better measure outcomes of pandemic-related strategies. As a new indicator, targets were identified and accomplishments are being monitored only for the period 2020 to 2022, following the PDP 2017-2022 enhancement guidelines.
b The conduct of CDP compliance assessments using the enhanced assessment guidelines only started in 2021.
c The data were updated following the new monitoring, reporting and verification process established, pursuant to DILG Memorandum Circular No. 2021-068, which enjoins LGUs to submit soft-copies of their LCCAP to CCC for monitoring and verification. The verified submissions are forwarded to DILG as basis for the SGLG assessment. Prior to the issuance of the said MC, the data being reported were based from the unverified self-monitoring reports by LGUs to DILG.
d The data are sourced from SGLG Assessment. However, the CY2020 and CY2021 SGLG Assessment were canceled due to the COVID-19 pandemic.