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Contents

RESEARCH ARTICLE

Advancing Carbon Neutrality in China: From Green-Oriented to Climate-Driven Public Finance

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Abstract

This article presented how the existing landscape of green public finance in China works in practice with a focus on government spending, taxation, and government fund, and assessed the alignment of these financial avenues with the goals of achieving carbon neutrality. The findings suggest that while China does not have a specific plan for public climate finance, the climate goals have been systematically integrated into key public finance avenues. However, the relevance and alignment of each component to the climate goals vary. The findings yield several insights for future policymaking in financing China's net-zero goal. It is recommended that China not only establish a green or climate budget system that incorporates climate considerations into decision-making processes but also proactively explores the potential of leveraging government expenditure and fiscal revenue to expand climate financing. On the expenditure side, China can increase its fiscal spending with a specific focus on green-oriented and climate-oriented initiatives, both in terms of overall size and proportion to GDP. On the revenue side, it is necessary to assess the feasibility of aligning tax measures with climate goals and explore potential synergies with other financial mechanisms. Ultimately, this article addressed the importance of accelerating the low-carbon transition with support from a green-oriented to a climate-driven approach in public finance.

Keywords: Green public finance, Public climate finance, Green investment, Low-carbon transition, Climate change, Carbon neutrality

I. Introduction

After a period of rapid development spanning thirty years, China has quickly risen to become the world's second-largest economy. However, this achievement has come at a great cost to the environment. The energy sector is the source of almost 90% of China's greenhouse gas emissions (IEA, 2021). It is worth noting that China has been the largest contributor to global renewables growth, leading investment in renewables capacity in 2019 with 83.4 billion USD (UNEP & BNEF, 2020). Despite China's efforts to develop renewable energy sources, China's GHG emissions have kept increasing in recent years and were only relatively flat in 2022, with growing emissions from combustion offset by declines from industrial processes (IEA, 2023).

In 2020, China committed to striving for peaking carbon emissions by 2030 and carbon neutrality by 2060 (Department of Resource Conservation and Environmental, 2021). To this end, a series of fundamental changes in energy, industry, transport, building, agriculture, and other sectors have to take place to facilitate the low-carbon transition. Meanwhile, meeting these goals will require unprecedented investments and vital support of green finance (Polzin & Sanders, 2020), which plays a critical component not only in addressing environmental challenges but also promoting sustainable economic growth (Wang et al.,

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2022; Zhou, 2022; Zhou et al., 2020). The research that attempted to project the investment under demand concluded that at least 100 thousand billion Chinese yuan would be in need (CICC Research & CICC Global Institute, 2022; He et al., 2020; Vigna et al., 2021). If considering the 211 industries included in the Green Industry Guidance Catalogue, an estimated 487 thousand billion Chinese yuan would be required, including both fixed investment and liquid assets (Ma et al., 2021).

Closing the financial gap will require massive capital from both the public and private sectors. To date, as China faces several key barriers to scaling up private green finance (Yu et al., 2021; Lee, 2020), public sources still account for at least more than half of the total green finance in China (Choi & Li, 2021). These public investments play a crucial role in advancing climate mitigation (Li & Shao, 2022; Xia et al., 2022), adaptation and resilience (Yao et al., 2022), renewable development (Li et al., 2022; Xu et al., 2022), and other environmental objectives. The mechanism of how green public finance and fiscal policies affect carbon dioxide emissions (CO_2) can be explained through several channels. First, green public finance plays an essential role in raising public revenues and leveraging private finance for green development (Peters, 2012). Second, they encourage investment in low-carbon technologies (Zhao et al., 2021) either by investing in cleaner technologies through providing subsidies or tax credits for firms that invest in research and development, production, and deployment of such technologies. Third, they correct price signals to shift consumer and business behavior toward more sustainable patterns (Cao, 2007). Fourth, they align government expenditure with sustainability goals (Petrie, 2021) by giving priority to green industries and low-carbon technological innovation projects in the allocation of social resources (Lee & Lee, 2022). Furthermore, green public finance, particularly green investment, can also bring co-benefits in reducing pollutants and contributing to economic growth and job creation (Strand & Toman, 2010). Green fiscal policies that lead to investments resilient to climate change also have the potential to reduce financial risks (Lamperti et al., 2021).

In theory, climate finance represents a subset of green finance, specifically targeting finance for climate mitigation and adaptation (Cheng et al., 2022; Lindenberg, 2014). Green finance encompasses a broader range of environmental objectives (Cai & Guo, 2021; Zhang et al., 2019). However, in practice, green public finance in China has not only facilitated green development but also laid the groundwork necessary to address climate challenges (Bhandary et al., 2021; Cheng et al., 2022; Lee, 2020). In response to the Action Plan for Carbon Dioxide Peaking Before 2030, the Chinese government has adjusted its policy priorities in green public finance, transitioning from a primary focus on pollution control to actively addressing the synergies between pollution control and carbon dioxide emission reduction. Thus, the policies and data associated with green public finance have become invaluable tools for evaluating public climate finance efforts. While the study of green public finance has made significant progress, several research gaps still need to be addressed.

First, many studies focus on discussing the concept of green public finance but have yet to keep up with the latest policy progress. The concept of green public finance was introduced in China in the 1990s. Wang et al. (2006) pointed out that the Chinese green fiscal policy aimed to promote green development through revenue and expenditure. By examining the characteristics

of ecological elements in the market economy and the public finance functions, Liu et al. (2017) concluded that fiscal revenue and expenditure are effective tools to promote energy saving, emissions reduction, and green growth. Jia et al. (2017) suggested constructing China's green fiscal policy system by reforming the energy price, harmonizing the green tax system, improving fiscal spending policies, strengthening the green finance market, and other measures. These studies discussed the key theoretical concepts underlying green finance, such as externalities, and reviewed the progress of green public finance and fiscal policies before the carbon-neutral goal was proposed.

Secondly, many studies have primarily concentrated on analyzing the growth of the green capital market, such as green loans, green bonds, and green funds (Bhandary et al., 2021; Escalante et al., 2020; Jin & Han, 2018; Lee, 2020; Li et al., 2018; Zhou & Li, 2019). China has leveraged various financial instruments to channel significant capital into green industries and initiatives. As a result, China emerged as the second-largest issuer of green bonds globally in 2021 (Deng et al., 2022) and established the largest green credit market, with its green credit balance expected to reach 22.03 trillion yuan by the end of 2022 (The People's Bank Of China, 2023). The development of regulations and standards in these areas has resulted in improved data and transparency. However, despite China's systematic policy framework to address climate change, there is currently no comprehensive dataset available specifically about to green finance or climate finance in the public sector. Consequently, there has been a notable lack of evaluation regarding the state of green public finance or public climate finance. Evaluating the progress and alignment of these practices with carbon-neutral goals becomes challenging.

Addressing these gaps, this article aims to provide a comprehensive review of the current state of green public finance in China with a focus on government spending, taxation, and government fund on a practical level. Furthermore, this paper assessed the relevance and alignment of these public finance avenues with the goals of achieving carbon neutrality. The primary contribution of this study lies in providing a comprehensive understanding of the landscape of green public finance and public climate finance with an analysis of the most recent policy progress and data.

Following this introduction, the remainder of this article is organized as follows. Section 2 explained the data and methodology used for this study. Section 3 outlines China's current green public finance landscape, analyzing the status quo of green spending, taxation, government fund, and the relevance of each avenue for achieving climate goals, as well as identifying untapped green public finance opportunities. Section 4 provides conclusions and actional policy recommendations drawn from the analysis to expand green public finance and improve public finance outcomes in response to achieving carbon neutrality in China.

II. Data and Methodology

In order to conduct an analysis of the current state of green public finance, the most recent policy progress with regard to green and climate public finance has been reviewed. Data relevant to green-oriented public spending, taxation, and government funds has been collected through multiple channels, as shown in Table 1, and analyzed respectively.

Data	Time	Sources
Fiscal spending	2007-2021	National Bureau of Statistics of China
Tax revenue	2007-2021	National Bureau of Statistics of China, Wind
Government bond	2021	China Electronic Local Government Bond Market Access
Government fund	2016-2020	China Statistical Yearbook

Tab. 1. Data and Sources
Source: Author

Based on the available data, a combination of methods has been applied to address different research objectives. Precisely, descriptive statistical analysis has been conducted with a comparative perspective to capture the size and trends of the conventional approaches in spending and taxation. To assess the status of green-oriented government funds, five funds have been chosen from the Chinese government fund catalog that demonstrate relevance to green development and contribute to environmental benefits to some extent. Our analysis primarily focuses on the scale and development patterns of these funds. The National Green Development Fund and Liaoning Province Green Industry Investment Fund are selected to exemplify the ways the government utilizes multiple funding sources through these funds to facilitate the low-carbon transition. Based on the findings of these analyses, this study presents policy implications and draws conclusions that contribute to a better understanding of the landscape of green public finance and public climate finance in China, as well as identifying potentials for scaling up public finance for the carbon-neutrality goals.

III. Overview of The Status Quo of Green Public Finance in Supporting Carbon Neutrality

China's green public finance development has been deeply embedded in the country's top-down governance approach. In 2021, the Chinese government launched the Action Plan for Carbon Dioxide Peaking before 2030, outlining its priorities and major economic policy instruments to support its climate goals. The plan emphasized creating a supportive tax system to drive green and low-carbon development, reforms to pricing policies such as electricity pricing, and the development of various financial instruments such as green credit, equity, bonds, insurance, and funds, to strengthen the green finance system. To translate the strategic decisions at the local level, a Climate Investment and Financing Pilot Work Plan has been carried out with 23 cities selected to facilitate climate finance.

To closely examine how these policy goals have been reflected in the major public finance avenues, this study assessed the alignment of these finance avenues with green development and climate goals, as shown in Table 2.

Compo-nents	Items	Relevant to green public finance	Relevant to public climate finance
Fiscal spending	Energy conservation and environmental protection spending	Yes	Yes
	Agriculture, forestry, water	Yes	Yes
	Natural resources,	Yes	Yes

	marine, and meteorology		
	Disaster prevention and crisis management	Yes	Yes
Taxation	Resource tax	Yes	No
	Environmental tax	Yes	No
	Pollution fee (Terminated in 2018)	Yes	No
Government funds	National Low-carbon Transition Fund	Yes	Yes
	National Green Development Fund	Yes	Yes
	Other environmental-related funds	Depending on the fund	Depending on the fund

Tab. 2. Major Public Finance Components Relevant to Green Public Finance and Public Climate Finance in China
Source: Author
Notes: Information collected and analyzed by authors

The findings highlight that while China lacks a specific plan for public climate finance, the climate goals have been systematically integrated into key public finance avenues. However, the relevance and alignment of each component in relation to the climate goals vary. For example, fiscal spending encompasses a broader range of objectives, including energy conservation, environmental protection, and forest preservation. While certain aspects of fiscal spending align closely with climate goals, others may not have a direct connection. Taxation measures primarily target pollution and resource management, which are not yet directly tied to climate goals. The following part will investigate the status quo of each component.

3.1. Green-oriented Spending

Green fiscal spending refers to government expenditures aimed at promoting environmental conservation and sustainable development (O'Callaghan et al., 2022). We noted that this spending can be understood in two ways. In a narrow sense, green fiscal spending encompasses only those expenditures that directly contribute to environmental protection. In a broad sense, green fiscal spending also includes expenditures promoting green production and consumption activities, which contribute to a green and sustainable economy. Within the Chinese policy context, certain spending categories can be broadly considered green-oriented spending. These categories include energy conservation and environmental protection, agriculture, forestry, water, natural resources, marine, meteorology, disaster prevention and crisis management (see Table 3). However, it is important to note that the relevance of these spending items to green development and climate policy goals varies as some exhibit a higher degree of alignment with climate goals such as energy conservation and environmental protection spending, while others demonstrate a lower level of relevance based on the spending items.

Spending category	**Spending items**
Energy conservation and environmental protection	Pollution control, return farmland to forest, ecology conservation, energy conservation, renewable energy, etc.
Agriculture, forestry, water	Agriculture development, rural area development, water projects, poverty alleviation, etc.

Natural resources, marine, and meteorology	Natural resources management, mineral resources investigation, sea area management, meteorological infrastructure construction, operation, etc.
Disaster prevention and crisis management	Forest fire prevention, earthquake prevention, rescue, etc.

Tab.3. Classification of Green-oriented Fiscal Spending in China
Source: Author
Notes: Based on government revenue and expenditure classification in 2021

As energy conservation and environmental protection spending directly align with environmental policy goals, we conducted a comprehensive analysis to examine its size and trend to gain insights into the priorities of environmental and climate policies within the budgeting process. Our findings reveal that from 2007 to 2021, this type of spending has quadrupled in size. However, its proportion relative to total fiscal spending and GDP has remained relatively stable, ranging from 2-3% of total fiscal spending and 0.3-0.7% of GDP, respectively (see Figure 1).

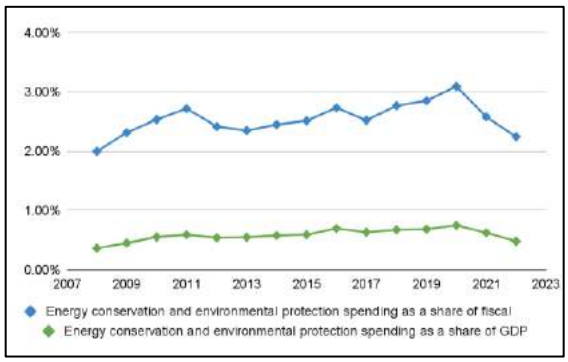

Fig. 1. Energy conservation and environmental protection spending accounted for total fiscal spending and GDP in China from 2007-2022.
Source: Drawn based on data from the National Bureau of Statistics of China.

When comparing to other expenditure categories, such as education (15%), social security and employment (14%), and general public service (8%), it becomes apparent that energy conservation and environmental protection spending accounts for a lower share of the total fiscal spending (refer to Figure 2). Moreover, in comparison to the European Union (EU), where environmental protection expenditure amounts to approximately 0.8% of GDP (Eurostat, 2020), the share of such spending in China's GDP is likewise lower. These comparisons indicate that China has room for improvement in terms of both the level and share of GDP. By increasing the allocation of funds towards green-oriented spending, China can strengthen its commitment to sustainability, environmental preservation, and climate change mitigation.

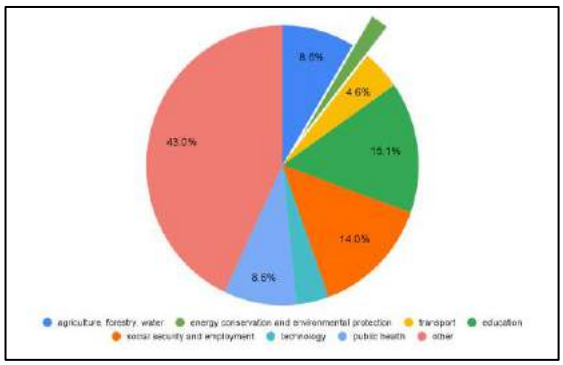

Fig. 2. Comparison of public spending by ratio in 2022.
Source: Drawn based on data from the National Bureau of Statistics of China.

3.2. Green-oriented Tax

Green tax is considered as either a form of investment relief for taxpayers who invest in pollution prevention or environmental protection or taxes imposed on industries that pollute or use pollutants (Eurostat, n.d.; Nellor & McMorran, 1994; Norregaard & Reppelin-Hill, 2000). In China, the green-oriented tax primarily consists of resource taxes and environmental taxes, which are directly levied for environmental protection purposes, as well as supplementary

taxes such as consumption taxes and corporate income taxes that play an indirect role in promoting green development.

Resource tax in China was first introduced in 1984, with the current framework established in 1994. The tax targets entities and individuals engaged in resource development, such as the crude, natural gas, and coal industries. Since 2007, the amount of resource tax collected in China has grown significantly, increasing from 26 billion to 228 billion Chinese Yuan, accounting for 1.1% of the government's total revenue in 2021. However, since the tax is levied primarily based on resource price or quantity and is not directly aligned with climate goals, its impact on reducing energy consumption or greenhouse gas (GHG) emissions is limited.

Category	Item	Tax rate
Energy minerals	Crude (6%), natural gas (6%), coal (2%-10%), etc.	1%-20%
Metal minerals	Black metal(1%-9%), non-ferrous metals (1%-20%), etc.	1%-20%
Non-metallic minerals	Minerals (1%-12%), rocks (1%-20%), etc.	1%-20%
Water vapor minerals	Carbon dioxide gas (2%-5%), mineral water (1%-20%)	1%-20%
Salt	Sodium salt, potassium salt, sea salt	2%-15%

Tab. 4. The Resource Tax Rate in China Since 2020
Source: State Taxation Administration

In addition to resource tax, China also had pollution fees levied on polluting industries, such as waste discharge and air pollution control fees before 2018. These fees aim to reduce pollution by making it more expensive to engage in polluting activities, thereby incentivizing companies to invest in cleaner technologies and processes. Companies and individuals responsible for generating wastewater, air pollutants, solid waste, hazardous waste, and noise pollution were required to pay fees based on the total amount of pollutants they generated. The collected fees were then utilized to provide subsidies or discounts on loan interests for pollution prevention and control technologies (Sun, 2007). However, the effectiveness of these pollution fees has been proved limited, as the fee standards were too low to compensate for the cost of pollution and were difficult to collect in practice (Wang, 2000). Therefore, in 2018, China replaced the pollution fee with the environmental protection tax. This tax was levied on companies based on the actual volume of pollutants they generated, and enforcement of the tax law was strengthened to ensure compliance. The environment protection tax has maintained a relatively stable trend, with an annual range of 17-20 billion Chinese Yuan (see Figure 3). The proportion of the environmental protection tax in total government revenue has decreased to 0.1%, considerably smaller than the resource tax (see Figure 4). It is also much lower than the EU, where environmental tax revenue accounted for 5.4% of the EU's total government revenue in 2020 (Eustat, 2022). Even though the environmental protection tax is not directly aligned with climate goals, its impact on reducing pollution contamination can indirectly contribute to carbon dioxide emission reduction to some extent.

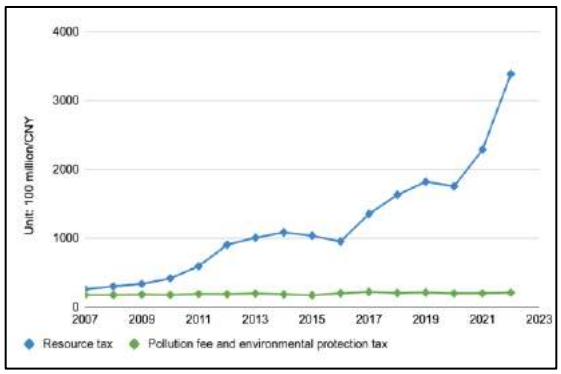

Fig. 3. Green-oriented Tax Values in China from 2007-2022.
Source: Drawn based on data from the National Bureau of Statistics of China

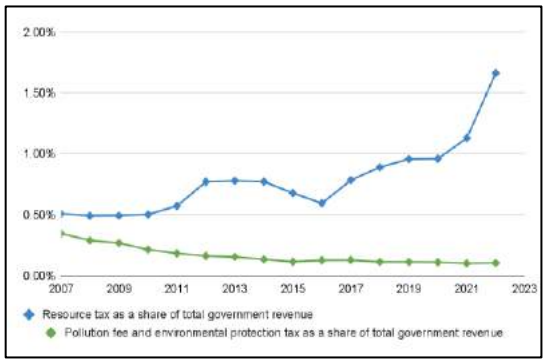

Fig. 4. Green-oriented Tax Percentage in China From 2007-2021.
Source: Drawn based on data from the National Bureau of Statistics of China

The current green-oriented tax has not directly aligned with the climate goals, thus, they provided limited economic incentives for industries to adopt cleaner technologies, reduce greenhouse gas emissions, and encourage energy efficiency. While China has not yet implemented a nationwide carbon tax, it has been exploring market-based mechanisms such as emissions trading systems (ETS) to curb greenhouse gas emissions. To generate revenues that can be used to fund investments in climate mitigation and adaptation measures, there is a need to assess the feasibility of aligning tax measures with climate goals and explore potential synergies with existing market-based mechanisms.

3.3. Green-oriented Government Fund

Government funds refer to the funds collected for specific objects within a certain period and used for public utilities (Chen, 2017). The green-oriented government funds listed in the Chinese government fund catalog have been thoroughly examined to assess their alignment with green development and climate goals. Among the funds analyzed, five specific funds as shown in Figure 5 have been selected as examples to evaluate their size and trend, considering their potential to contribute to environmental benefits.

Of these five funds, the renewable energy development fund and the sewage treatment fee have seen steady growth, with larger volumes from 2016 to 2020. The renewable energy development fund is directly aligned with climate policy goals, as it is primarily utilized to subsidize the development of the renewable energy industry. This funding source plays a crucial role in supporting the expansion and advancement of renewable energy projects, which contribute significantly to reducing greenhouse gas emissions and mitigating climate change. While other funds may focus on broader environmental conservation and sustainability initiatives, they may not be specifically targeted for climate-related purposes.

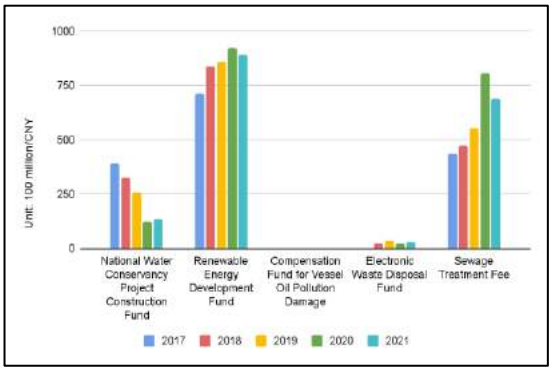

Fig. 5. Green Government Fund in China
Source: Drawn based on data from the National Bureau of Statistics of China.

The existing green-oriented government funds, primarily relying on public fund sources, have offered limited support for the goal of achieving carbon neutrality. Their relatively small sizes and dependency on public funds hinder their potential impact. To address this limitation, it is crucial to involve more private financial resources by establishing government-led funds that engage multiple stakeholders, including banks and companies.

In recent years, there has been a notable growth in green industry investment funds, encompassing a range of funds such as international cooperation funds, national green development funds, and local green development funds. These funds operate with the support and backing of the government, and their investments are primarily directed toward projects outlined in the Green Industry Guidance Catalog. Due to the government's endorsement and credibility, these funds often enjoy the trust of financial institutions and other investors. This enables them to effectively meet the financing requirements of the green industry. The alignment between the funds' objectives and the financing needs of green projects contributes to their success in attracting investment and promoting sustainable and environmentally friendly initiatives.

The development of green industry funds presents an opportunity to harness the power of capital and effectively mobilize social capital at both the national and local levels. For instance, at the national level, the establishment of the National Green Development Fund in July 2020, led by the Ministry of Finance, the Ministry of Ecology and Environment, and Shanghai Municipality, with an initial scale of 88.5 billion yuan, aims to primarily invest in 11 provinces and cities along the Yangtze River Economic Belt. With a leverage ratio of 1:5, it is anticipated to mobilize nearly 400 billion yuan of social capital for investments in ecological and environmental protection (Dong, 2021). On the provincial level, as an example, Liaoning Province set up a 3 billion yuan green industry investment fund in 2020, initiated by the Liaoning Provincial Environmental Protection Industry Association, to invest in the equity of exemplary environmental protection companies and key projects in the industry.

While policies encourage and support green industry investment funds, there is a need to establish incentives for investment. Currently, only a few provinces and cities have implemented measures to support green funds, as green investments may involve certain externalities that do not align with the investment objectives of private capital in terms of investment cycles, returns, and risks. Therefore, incentives such as tax reductions are crucial to attract private investment.

IV. Conclusions and Policy Implications

The landscape of green public finance is dynamic and constantly changing in China, along with the adjustment of the financial demand and policy objectives. This paper provides a review of the current status of the major public green finance aspects, including fiscal spending, taxation, and government funds, and seeks to understand the existing landscape of green or climate public finance on a practical level. Furthermore, this paper assessed the alignment of these financial mechanisms with the goals of achieving carbon neutrality by examining the trends and relevant practices. Moreover, the analysis identified untapped opportunities for green public finance that go beyond conventional approaches.

This study concludes that while China does not have a specific public climate finance plan, the climate goals have been systematically integrated into key public finance avenues and development strategies (Gonguet et al., 2021). However, the relevance and alignment of each component to the climate goals vary. Moreover, there is still potential to leverage more public financial resources. Firstly, China has room for improvement in energy conservation and environmental protection spending in terms of both the level and share of GDP. Secondly, while China has established resource tax and environmental protection tax, they account for a low government revenue ratio and have not directly aligned with the climate goals. Thus, they provided limited economic incentives for industries to adopt cleaner technologies, reduce greenhouse gas emissions, and encourage energy efficiency, which has also been addressed by Xue et al. (2020). Thirdly, among current major government funds, the renewable energy development fund is directly aligned with carbon neutrality goals while other funds focus on broader environmental goals. The findings yield several insights for future policymaking in financing China's net-zero goal.

Firstly, it is crucial for China to establish a green or climate budget system that incorporates climate considerations into decision-making processes. This entails prioritizing climate actions in budget allocations and adopting a 'whole of government' approach to effectively utilize spending, taxation, and market-oriented mechanisms (C40, 2021). It is necessary to set science-based emission reduction targets at the national, subnational, and sectoral levels, aligning them with public finance and fiscal plans. To enhance implementation, a monitoring system should be in place to track budget plans and evaluate financial progress toward achieving carbon neutrality goals. Additionally, the budget system should track and differentiate financial flows based on objectives related to pollution control, nature conservation, and carbon neutrality (Liu, 2022), which are the three major works that green public finance attributes to. As such, the financial resources can be coordinated and monitored in a systematic approach.

Secondly, China should proactively explore the potential of leveraging government expenditure and fiscal revenue to expand climate financing. On the expenditure side, China can increase its fiscal spending with a specific focus on green-oriented and climate-oriented initiatives, both in terms of overall size and proportion to GDP (Gao, 2018; Liu, 2022; Zhang, 2017). To maximize the effectiveness of these expenditures, it is crucial to align them with the green industry catalog or green finance taxonomy, directing funds towards activities and projects that promote renewable energy, low-carbon transportation, decarbonization in manufacturing, and more (Shi & Liu, 2022). Increasing government spending on technology and education is also important, as these areas indirectly contribute to carbon neutrality and green development (Sun, 2007). On the revenue side, it is necessary to assess the feasibility of aligning tax measures with climate goals and explore potential synergies with existing market-based mechanisms to mobilize more green public finance. This includes incorporating a 'carbon constraint' into current tax measures and establishing an effective carbon pricing mechanism (Li & Jia, 2017), such as improving the emissions trading system (ETS) or implementing a new carbon tax (Zhang, 2017). This ensures that the true cost of carbon emissions is reflected in economic activities.

Thirdly, multiple financial sources can be leveraged through government-led funds

that engage various stakeholders, including banks and companies, both on the national and local levels. The central government needs to create platforms that bring together stakeholders from the public and private sectors to identify potential green projects and investment opportunities. Offering incentives, such as tax breaks, grants, or subsidies, can encourage companies and investors to allocate funds toward climate-friendly projects (Dong, 2021). Meanwhile, regulatory bodies should establish green fund standards and investment guidelines, clarifying the concept, scope, and investment areas of green industry funds to provide clear definitions and recognition criteria for green or climate-oriented funds to avoid greenwashing (Shenzhen Green Finance Committee & CEEX, 2019).

We have identified three areas for future research to address these gaps. Firstly, given China's lack of a climate budget system, further research is needed to explore how to establish such a system based on current policy and financial progress. Secondly, as multiple policy measures are implemented concurrently, it is important to analyze the trade-offs and co-benefits between green public finance and other forms of finance. This analysis will help policymakers harmonize different goals and establish an integrated finance system. Lastly, it is crucial to explore effective ways of engaging private capital and mobilizing additional financial resources through innovative policy measures and financial instruments.

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RESEARCH ARTICLE

Crop Switching as Climate Change Adaptation Strategy of Farmers in the Province of Batangas

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Abstract

The geographical scope of the agricultural crops is changing as a result of climate change. In order to reduce the possible negative impacts, notably in developing countries such as the Philippines, this shift requires that crops are switched effectively at community level. In the agricultural communities of the Batangas province, the study identified the social and environmental determinants of crop switching as a locally relevant option for resilience building. One of the key conclusions is that temperature extremes prompted smallholder farmers to abandon crops that cannot tolerate climatic stresses. Introduction of short duration crops and adoption of heat and moisture resistant seed varieties alongside implementation of community-based approaches are suggested to curtail the adverse impacts of climate risks.

Keywords: crop switching, climate risk resilience, smallholder farming, Batangas

I. Introduction

In the past few years, climate change and its impacts have become more evident, especially regarding extreme weather events and disasters. As a result of the uncertainties and risks resulting from climate change, developing countries like the Philippines have also become more vulnerable. In light of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report, many adaptation options can help address climate change, but no single option is sufficient by itself. Effective implementation depends on policies and cooperation at all scales and can be enhanced through integrated responses that link adaptation with other societal objectives. (IPCC, 2014).

In the context of climate change, people's creative genius and adaptability are well recognized. For centuries, at a variety of spatial and temporal dimensions, human beings adapted to the changing climate around them. It's incorporated into man's systems, which take account of the climate as it is. In particular at the local level, climate variability affects peoples' choices with consequences for their social, economic, political and personal circumstances as well as impact on their lives and livelihoods. The ability of people to survive through mainly autonomous coping mechanisms and survival strategies is provided by constant challenges in human well being.

The climate change literature generally defines adaptation as changes to the system in response to climatic stimuli.To effectively manage the risk of climate change, it is essential to implement strategies for both mitigation and adaptation. However, a line does not necessarily need to be drawn between vulnerability reduction interventions (e.g. livelihood diversification, literacy promotion and capacity-building activities) and impacts-targeted measures when they can be seen in a continuum of approaches. In this way, a wide range of development issues, such as actions to reduce poverty and build capacity to address risks and climate change impacts, may be covered by adaptation efforts.

In recent years, due to the individual actions of communities and the need to

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mainstream climate change adaptation into the development process, local adaptation activities have received a lot of attention. Adaptation at the local level is about strengthening communities by building on their own strategies to cope with climate change, enabling them to engage in policy development related to climate change. Adaptation at the local level is about strengthening communities, building on their own adaptation strategies to cope with climate change and empowering them to participate in the development of climate change policies (Reid et al., 2007). The adaptation is specific to the particular location and therefore local actors are of crucial importance for achieving a real impact on the ground. For example, the local government has a key role to play in creating an enabling environment for adaptation. As far as policy is concerned, rapid adaptation actions can be helped by the support of local governments. The capacity of actors to take action, data available at local level and funding support for adaptation initiatives (McGray et al., 2007; IFRC and the ProVention Consortium, 2009), are key factors that contribute significantly towards achieving a significant degree of impact.

From national to community level, decisions on adaptation strategies and measures are taken, Carter and Raps, 2008. Action and commitment of national governments to the preparation of policies and strategies for dealing with climate change have been increased in view of the urgency of this issue. However, few strategies have been developed at national level that take into account the local context or are tailored to the different local scenarios. There is often a lack of coherence in the national and provincial frameworks as well as at village level policy. During the planning and development of adaptation strategies, there is a lack of awareness about the importance of regional context. This means that efforts to adapt fail to achieve a real impact on the ground.

This study identifies socio-economic and environmental determinants to adopt crop switching as a locally relevant resilience-building option in agricultural communities in the province of Batangas, particularly in Barangay Halang in Lipa City. This also analyzes the vulnerability of these communities and assess impacts of hazards directly from the point of view of those affected themselves.

This paper provides an answer to the question ‘What are the socio-economic and environmental determinants to adopt crop switching as a locally relevant resilience-building option in agricultural communities in the province of Batangas particularly in Brgy. Halang, Lipa City?'. This also analyzes the vulnerability of these communities and assesses impacts of hazards directly from the point of view of those affected themselves. Specifically, this determines the crops that have been either adopted or abandoned by the farmers over the past 20 years. Also, this identifies the drivers to either adopt or abandon the crops.

In Batangas farming communities, we conducted a comprehensive assessment of crop transformation as a climate change adaptation strategy. Crop Switching is expected to significantly reduce climate-related agricultural damage, particularly among small farmers, informing local government adaptation planning.

This study builds on the works of Tessema et al. (2019), Alauddin and Sarker (2014), and Mertz et al. (2009) to identify the specific types of crop switching decisions induced by climate change and their determinants. Crop switching decisions were examined specific to the level of individual crops with the aim of identifying the

determinants of the specific crop switching decisions primarily motivated by climate change. The examination of crop switching in detail at the level of individual crops enabled us to validate the results based on predictions from studies on crop distribution modeling and ecological change. This will be a key addition to the literature on farm-level adaptations in general where the link between climate change and farm adjustments is still unclear. The identification of the socio-economic and environmental determinants of crop switching is also vital to suggest interventions that could keep adjustment costs as minimal as possible.

The Philippines agricultural sector, which contributes around 12% of the country's Gross Domestic Product (FAO 2017), employs about 32% of its population with an economic activity. The lack of infrastructure, as well as political and institutional obstacles to the sector's ability to meet food demands due to an increasing population has resulted in a combination of agricultural characteristics such as small scale but fragmented farms that are difficult to cope with. This has resulted in a heavy reliance on food imports, especially wheat and rice, the population's main staple crops (FAO, 2017).

1.1. *Agriculture and Climate Change*

A relatively hot climate with high humidity and abundant rainfall prevails in the Philippines. The warmest month of the year shall be January with a mean temperature of 25.5 C, while May's is 28.9 C. However, changes in altitude lead to significant variation in temperature throughout the country and mean annual temperatures are 26.6 C. In Baguio, a high mountain town in the north of Luzon, for instance, temperatures are more closely related to mild temperate areas. The country has a high relative humidity, ranging from 71% in March to 85% in September. The mean annual rainfall ranges from 965 to 4,064 mm. The most rainfall will come from Baguio City, East Samar and Eastern Surigao while South Cotabato receives the least. The Philippines has two major seasons: the dry season which runs from December through May, and the wet season that runs from June to November. Between 1951 and 2010, the country experienced an increase in its average temperature of 0.64C. According to climatic projections of the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA), all areas of the country are expected to get warmer in the short- (2020) and medium term (2050). A reduction in rainfall is also projected during the months of March, April, and May.

The Philippines is one of the countries that are vulnerable to climate change because of its geographic location and archipelagic structure. This country is the world's most vulnerable to tropical cyclones, with the highest exposure of people to these events, and it's among the most affected by extreme weather events. Furthermore, the agriculture sector has experienced an annual high proportion of damage due to disasters, which are primarily caused by climate change. Typhoons, droughts, and floods accounted for 70%, 18%, and 5%, respectively, of the damage to agricultural production from 1990 to 2006. According to estimates, the industry is expected to incur a total of US$ 136 million annually due to typhoon damage. Recent studies have indicated that, in general, the Philippines economy could be hit with about US$505 million a year by 2050 due to climate change. Climate change and variability are expected to reduce yields of crops, increase the occurrence of pests and diseases and cause shifts in crop production suitability as a result of increased water and heat stress. By providing suitable conditions for the

emergence of new crops, upland areas could thus benefit from an increase in temperature.

1.2. Response Options for Adaptation and Mitigation

Burton et al. (1978) propose a society based classification of adaptation and adaptation to natural hazards on the basis of people's perception of nature's threat in a landmark book, "The Environment as a hazard". Unconscious biological and cultural adaptations are distinguished from accidental or intentional changes in this classification. Traditional societies have been accused of being incapable of facing natural hazards and are compared with industrial Western societies whose adjustment has proven more efficient but still not perfect. Institutions such as National Governments, International Organizations, and consultant agencies involved in the management of volcano hazards and disasters have also been experiencing a paradigm shift towards perception adjustment. In the face of volcanic threats and inadequate behavioral response, structural and technical solutions (e.g. sabo dams and dikes to control lahars, electronic devices to closely monitor the activity of the volcano, hazard mapping) are preferred along with evacuation plans and information campaigns to raise people's perception of hazardous phenomena. At the beginning of the 1990s International Decade for Natural Disaster Reduction, influence and recommendations derived from a perception adjustment paradigm can be seen. During that period, when it was argued that volcanic eruptions did not cause too much damage to developing countries which bore the brunt of volcanoes' havoc (Benblidia 1989, Lechat 1990), the United Nations pushed for an increased financial, technical and experience transfer from industrialized countries.

Drawing on cases from the economically developing world, scholars such as O'Keefe et al. (1976), Hewitt (1983), Wisner et al. (2004) argue that the social, economic and political forces beyond their control constrain people's behavior when faced with natural hazards. Unpowerful persons living in areas of danger without adequate physical or social protection are being forced to do so by political neglect, social marginalization and lack of access to resources. This view stresses the vulnerability of people and their susceptibility to damage in the event of natural disasters. The vulnerabilities of disaster victims are reflected in the set of indicators. Victims of natural hazards are frequently disproportionately drawn from marginal social groups such as women, children, elderly and the disabled. The vulnerable also include people with limited or precarious income, who are less able to protect themselves against natural hazards due to insufficient wages, informal employment, lack of savings that reduces their ability to take protective action on the basis of home location, types of housing and knowledge of protection measures. The lack of social protection, such as medical insurance, health services, building rules, prevention measures etc., and limited social capital solidarity networks are also contributing to vulnerability. In the light of these facts, it is therefore essential to take a critical look at both people's vulnerabilities and their root causes which are found in everyday and unique local contexts (Chester 1993, Wisner 1993). Then instead of being an extreme and rare phenomenon, the natural hazards can be regarded as a source of illumination or amplifier for daily suffering and everyday emergencies (Hewitt, 1983, Maskrey, 1989).

In principle, social, political and economic factors, such as poverty reduction, fair access to land and resources, better social

protection through government investment in social services, are recommendations to mitigate people's vulnerability in the face of natural hazards. Specific risk management measures are viewed through community-based disaster risk management which underlines people's participation in hazard, vulnerability and risk assessment (e.g. Anderson and Woodrow, 1989, Bankoff et al., 2004). In 1994 at the International Conference on Disasters Reduction Yokohama Japan, UN support was obtained for such activities leading to a change in international disaster management policy.

1.3. Adaptation Strategy in Batangas Province

Meanwhile, in the province of Batangas, the City Veterinary and Agricultural Services (OCVAS) of Batangas City in collaboration with the East West Seed Co. have introduced intercropping methods in the Pinamucan area of the said city. It is this multi cropping practice which involves the production of two or more crops in proximity. This practice may allow farmers to evaluate the suitability of crops. Due to its location and hill terrain, irrigation has been a challenge for the agricultural sector of Pinamucan. Intercropping facilitates the choice and cultivation of crops that yield higher yields, which allows farmers to adjust to their climate conditions so they are able to earn more. In an intercropping farm in Pinamucan, bitter gourds, string beans, eggplants, green chilies, tomatoes and watermelons are among the most productive crops. To allow local farmers to test the best commodity for which they can derive maximum benefit, the City Agriculture Office has also launched a number of new varieties. For all the varieties that are grown together, a single harvest schedule does not exist. The yield is therefore erratic. They weigh the yields after they are harvested so that records of them can be kept. Farmers do not only sell their products in the market, they also consume them to meet their basic needs. It is considered possible that the intercropping approach will be an option to increase agriculture's productivity, which would enable farmers to ensure food security throughout the year. Farmers also collect crop seeds at the same time as harvesting the produce, which are then used for the next round of cultivation. Local farmers are not accustomed to the practice of intercropping. The effort to measure that method's potential for improving crop stability and ensuring food security in comparison with monocropping systems is also supported by this. Local farmers in Pinamucan have been appreciative of the use of intercropping. It's a way for them to make money, and many also involve members of their families in the farming activities. This climate resilient cropping practice has brought smiles to many faces.

1.4. *Crop Switching as an Adaptation Strategy*

According to global modelling studies analyzed by Costinot et al. in 2016, an effective crop switch can prevent a third of the potential damage from climate change on agricultural production. In this context, we shall consider crop switching to include two types of changes: the initiation of a new crop for the first time; and the abandonment of existing crops. Thus, as opposed to farm level, the term switching is more easily understood at plot level; i.e. planting a new crop does not necessarily mean that it abandons current crops or vice versa.

Studies of crop switching as adaptation response and factors facilitating it have been carried out in the past. The majority of these studies sought to discover whether farmers were adapting by changing crops and what type of socioeconomic or environmental factors affected this process (Maddison et al., 2007; Deressa et al., 2011 Gbetibouo, 2009;

Bryan et al., 2013). These studies do not attempt to separate from each other the different types of adaptation decisions which are primarily driven by climate change, but consider crop changes only as one type of adaptation response. According to the literature, this is a major gap since some types of switching decisions might be driven by non climatic drivers like priceSeo and Mendelsohn, 2008, amongst others. The relevant focus in the preceding studies was not placed on non climatic variables (Below et al., 2012; Fosu-hanMensah et al., 2010; Gbetibouo et al., 2010). However, the shift in crop composition is driven by a range of factors such as market dynamics, pest incidence and soil degradation. Therefore, it is essential to take account of these drivers so as to gain a good understanding of the actual importance of climate change in changing crops.

II. Data and Methodology

2.1. *Study Area*

Barangay Halang is a part of Lipa City in the province of Batangas. It is located at the northwest end of the city and is the only barangay of Lipa that has access to Taal lake. With an area of 280.596 hectares, Halang is divided into six administrative units or puroks. The divisions seem to be more related to the minimum basic needs program of the central government planning office than to administrative reasons. However, such division is very useful to assess the barangay.

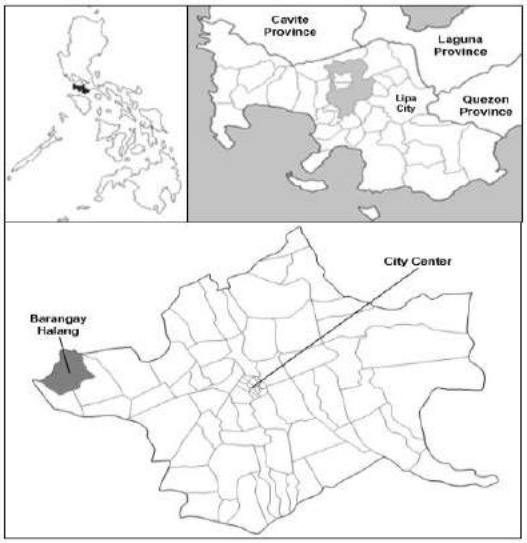

Fig. 1. Location map of Barangay Halang in Lipa City, Batangas province, and country

The upland area is composed of purok 1, 2, 3, and 4. Purok 5and 6 in fact are considered to be one unit and named “sitio Tagbakin” since they form a residential area and are geographically distant from the rest of the barangay. Households are on both sides of the main road that passes through the middle of the barangay from south to north down to the Taal lake coast. This road leads to a freeway that eventually leads to Lipa’s downtown. In fact, from the gates of the barangay to the freeway this road also goes through another two barangays. The first four puroks are located at the sides of this main road from the entrance until mid-way to the lake, while the rest of the journey has no households. Once the main road reaches the coast, it turns left, following the shores of the lake. Beside this coastal road is where sitio Tagbakin is located. The road ends at a rock elevation where there are also some houses.

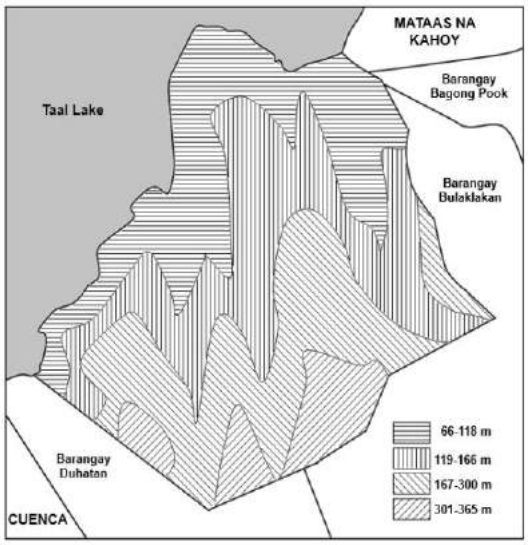

Fig. 2. Topographic Map of Barangay Halang

Farming is one of the principal income generating activities in the barangay, and covers the biggest area in the system. Many benefit from coconut raising; many people are farmers. Halang has rich natural resources for farming. Farm products include coconut, coffee, lanzones, and vegetables.

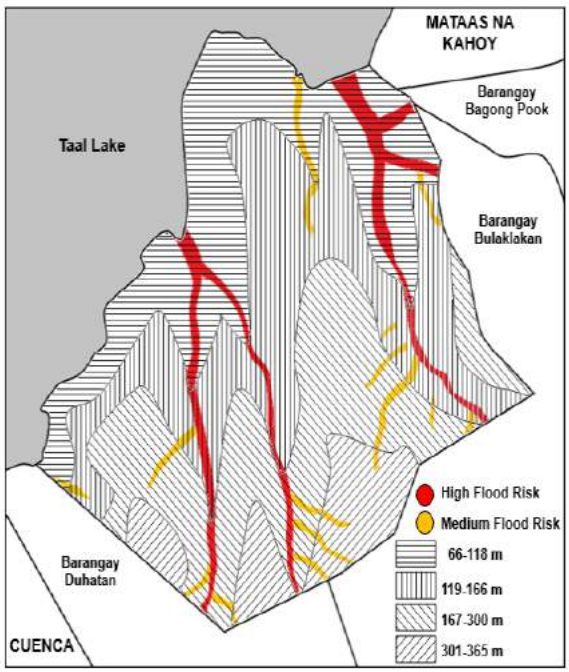

Fig. 3. Flood hazard map of Barangay Halang

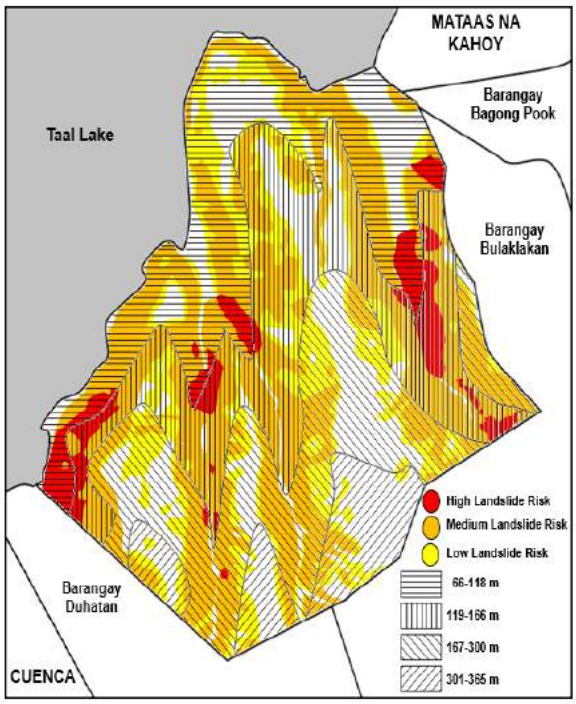

Fig. 4. Landslide hazard map of Barangay Halang

1.2. *Data Collection*

The types of crops that farmers have been permanently adopting or abandoning for the last 20 years are a first key issue that was examined. For each of these crop switching decisions, respondents were asked through focus group discussion to identify the first and second most important drivers from a list of potential drivers: climate change, pest and disease, price change, soil erosion and changes in intra household characteristics. Respondents were also given the opportunity to mention other drivers in case the list is not exhaustive enough for them through the discussion which was being conducted.

1.3. *Ethical Considerations of the Study*

The research project was conducted with full respect of the ethical standards in this field. The research started with a focus group

discussion with farmers in Brgy. Halang in Lipa City and involved human participants.. The researcher takes on the primary responsibility of clarifying clearly what research is about to its participants. A one page "project information document," describing the study's objective, who is financing and carrying out the study, as well as its dissemination and use, was provided to each research participant.

III. Findings and Analysis

This section reports the findings of the study based upon the information gathered. The findings are particularly relevant for adapting crop switching as a climate change adaptation strategy in the context of smallholder agriculture in the province of Batangas.

Coconut, banana, gabi, ube, calamansi, and citrus are the crops that have been adopted by the farmers over the past 20 years in Brgy. Halang in Lipa City. Although planting is still manual using a hoe, these crops need minimal care. These crops come back every year without replanting and there is no need to rush each spring to prepare the soil to plant between rains. This is a huge benefit to farmers who want to avoid the trap of over-work and micro-management.

Coffee, cacao, rice, corn, pepper, lanzones, luya are the crops that have been abandoned by the farmers over the past 20 years. Climate change, crop diseases, low price, pest, and household changes were the reasons why the farmers no longer plant these crops. For instance, coffee farming means living an uncertain life with a great deal of difficulties in producing the beans. Although there are measures that may improve quality and thus prices, market trends and harvest yields and quality reported by the farmers are not predictable. Nothing is certain until the local entrepreneurs bag, cup, and sell the coffee. The coffee industry is lucrative, but it's notoriously underpaid to producers. The increasing temperatures and changing precipitation patterns are currently a result of climate change.

The land available for coffee cultivation has decreased as the climate changes. In fact, an Intergovernmental Panel on Climate Change Forecasts a 10 to 20% drop in total crop yields by 2050. The fact that climate change is spreading pests and threatening plants and crops must also be borne in mind.

In the 2018 Observed Climate Trends and Projected Climate Change in the Philippines report by the Department of Science and Technology and the Philippine Atmospheric, Geophysical and Astronomical Services Administration (DOST-PAGASA), it suggests a wide range of future changes in Philippine rainfall. In many areas, especially in Mindanao, by the end of the 21st century, the driest possible change in rainfall could exceed 40%. The wettest possible change, on the other hand, could exceed a 40% increase in rainfall, particularly over Luzon, western sections of Visayas, and some parts of Mindanao. The multi-model central estimate future rainfall conditions will be well within its natural variability; except for the drier future over central sections of Mindanao, particularly in September-October-November and the December-January-February seasons, which might require actionable climate change adaptation plans.

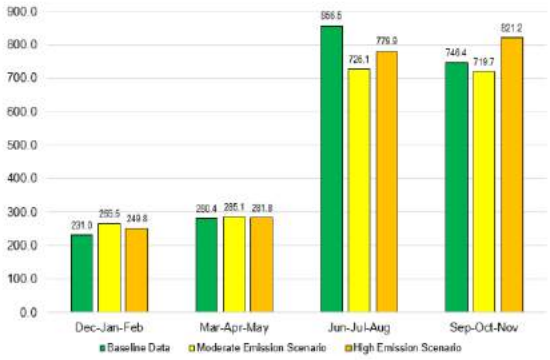

Fig. 5. Climate Information Risk Analysis Matrix (CLIRAM) of the projected seasonal change in total rainfall (in millimeters) in the mid-21st century (2036-2065) for Batangas; baseline period: 1971-2000

Meanwhile, most areas in the country have experienced air temperatures exceeding 26°C, while as expected, slightly cooler areas are found in mountainous regions. These temperatures are projected to increase uniformly and minimally across the country in both the moderate-emission and the high-emission scenarios.

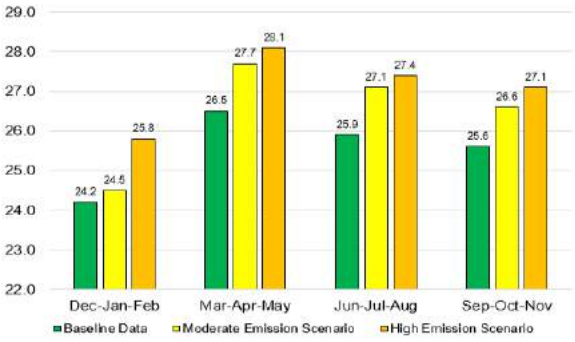

Fig. 6. Climate Information Risk Analysis Matrix (CLIRAM) of the projected seasonal change in mean temperature (in degree Celcius) in the mid-21st century (2036-2065) for Batangas; baseline period: 1971-2000

Given these facts and the existence of climate risks, introduction of short duration crop varieties is likely to contribute to limiting negative effects on climate risk (Lasco et al 2011). Corn, root crops such as sweet potatoes and cassavas, vegetables like asparagus, string beans, cabbage or mushrooms are also cultivated to a shorter duration. Similarly, it is possible to address the problem of insufficient heat or humidity by selecting seed varieties with a warm and moist resistance.

Community-based approaches are suggested to address the challenges. These approaches take into account the inherent adaptability capacities of vulnerable communities, which they aim to build upon. The importance of adaptive capacity in building resilience is that it entails processes and capabilities enabling a continuous response to changing and uncertain climatic conditions over time. When climate vulnerable communities are given greater access to, accumulation and control of assets, knowledge and information, confidence in and access to innovation, access to effective institutions and entitlements, and are able to make more flexible and forward looking decisions, their adaptive capacity is strengthened.

Meanwhile, household changes, particularly aging farmers, is another reason for abandoning farming of the aforementioned crops. In the Philippines, the average age of a farmer is already 57, according to the Department of Agriculture - Agricultural Training Institute (DA-ATI) in 2013. Farming may not be their choice for their children's future, although several farmers have survived the economic and environmental crises of the last decades. The aging farmers toiling on the land since the 1970s and 80s are what Pamela Riney-Kehrberg, professor of history at Iowa State University in the US, calls "last generation" farmers. Maybe they have children and relatives who will inherit the land. But a lot of them haven't had anyone to farm for quite some time.

Respondents of this study are open to new strategies, nevertheless, they have doubts. A farmer's reluctance to take risks, the loss of local knowledge and limited access to agronomical information hinder his ability to adopt diversification strategies. In particular, it is smallholder farmers who stand to benefit from this. Hence, increasing awareness on climate change adaptation at the barangay level may help alongside building the capacity of municipal and local government officials, promoting and increasing multi-stakeholder participation, promoting income diversification, and enhancing coordination between the institutions implementing policies on adaptation to climate change at various levels.

IV. Conclusions and Recommendation

Temperature extremes prompted smallholder farmers to abandon crops that cannot tolerate climatic stresses. Introduction of short duration crops and adoption of heat and moisture resistant seed varieties alongside implementation of community-based approaches were suggested to curtail the adverse impacts of climate risk.

Not only reducing vulnerability to climate change, but also sustainability and livelihood improvements are at the heart of adaptation strategies. How people, especially the vulnerable, are able to sustain their livelihoods and the role of natural resources and external services in their livelihood activities need to be communicated to local adaptation. As a basis for building resilience in towns and cities, the most effective combinations of measures should be used to safeguard and enhance their community asset base and provide better services. Local adaptation strategies, which aim to build resilience for livelihoods, are therefore of crucial importance because they will have a considerable impact on how the Community copes with climate change. Table 1 outlines recommendations and actions to reduce climate change vulnerability and enhance human and social assets in Brgy. Halang.

Recommendation	Specific Action Plan
Increasing awareness on climate change adaptation at the barangay level	The Agriculture Committee of the Lipa City government unit needs to scale up information, education and communication on climate change and to address the gaps in knowledge and information sharing at the barangay level
Building the capacity of municipal and village government officials	Provide Information, Education and Communication and training of barangay officials on climate change
Promoting and increasing multi-stakeholder participation	Develop ties with the academe, NGOs operating in the city and the private sector to encourage collaboration and support in terms of research, funding and facilities
Introducing short duration crop varieties, and adopting heat and moisture resistant seed varieties	Introduce short duration crops as these may help to reduce climate risk's adverse effects; and heat and drought resistant seed varieties, in order to solve the problem of excessive warmth or humidity
Promoting income diversification	Promote agricultural products and explore social enterprises in non-climate-sensitive sectors especially in the lean months
Increasing coordination at different levels of institutions that implement climate change adaptation policies	Introduce insurance mechanisms and other community-based approaches to address climatic risks and challenges

Tab.1. Recommendations and actions to reduce climate change vulnerability and enhance human and social assets in Brgy. Halang

Although there are possibilities of adapting to climate change in agriculture, lack of

awareness at the barangay level, lack of support from institutions and financing hinder smallholder farming to face climate variability. Some technical measures together with local knowledge may help initially, however, research related to the magnitude of climate change impacts on specific crops varies among ecological zones. In addition, it relies primarily on the available resources for smallholder farmers to address these challenges. It is very difficult and virtually impossible to draw conclusions from this context regarding the impact of climate change on peasant farming, as well as its consequences. Moreover, there is a limited number of studies that assess the effects of climate conditions on crop yield beyond temperature and thus an area for further research.

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RESEARCH ARTICLE

Collaboration to Build Resilient Farmers' Human Resources: Digital Literacy Program in Agriculture as a Joint Education Effort

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Abstract

This article aims to examine the importance of the role of government and society in collaborating, especially in improving society's capabilities in the agricultural sector. In this case, development communication has an important role, especially in the form of participatory development communication and community empowerment. However, technological aspects cannot be separated from development communication. Electronic agriculture (e-Agriculture) has become something that farmers need to do to improve the quality of their agriculture. Since the penetration of information and communication technology, the use of this technology has become increasingly massive, especially in searching for information. This encourages the active role of government and society in providing facilities to support the development of human resources for farmers. In this case, digital literacy skills are very important for farmers to have, starting from searching for information, managing information resources, forming digital collaborations, to efforts to increase digital participation. These skills need to be built wisely so that the use of technology in the agricultural realm can be carried out well.

Keywords: e-Agriculture, collaboration, digital literacy, farmers, technology

I. Introduction

The development of a country cannot be separated from concern related to the fulfillment of basic needs. This is inseparable from the development of the agricultural sector which has become a national issue in Indonesia, especially related to current food needs (Jaya, 2018, p. 197). For Indonesia itself, agricultural issues have become an important issue and are considered by the government. Moreover, Indonesia is a country that has vast agricultural land (Vintarno, Sugandi, & Adiwisastra, 2019, p. 90). Based on data published in the report of the Agricultural Data Center and Information System (2020), it is explained that in 2019 the non-rice field agricultural land in Indonesia was 29,353,138 Ha and the rice field area was 7,463,948 Ha. This data also shows that basically Indonesia as an agricultural country already has the capital to continue producing the basic needs of the entire community.

Even though the area of agricultural land, both rice fields and non-rice fields, is quite extensive, Indonesia is also experiencing a crisis of young farmers. This is shown based on data published on dataindonesia.id (2022) where in 2018 there were 885,077 farmers aged under 25 years. Meanwhile, there tend to be more farmers over that age. even for those aged 35-44 years it reaches more than 9 million farmers. This data shows that the younger generation's interest in becoming farmers is very low, especially for the millennial generation and generation Z. The tendency to work as farmers is still dominated by the younger generation. The tendency to work as farmers is still dominated by the generation above. Of course, this cannot be separated from the problems of the times and industrial

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developments which have made the younger generation abandon the choice of working as farmers.

The issue of the farmer crisis is indeed an important issue because it can have an impact on the issue of food sovereignty in Indonesia. Especially when you consider that farmers have a very important role in fulfilling food needs for a country (Sidharta, Tambunan, Azwar, & Ghaniyyu, 2021, p. 229). Not only farmers who harvest rice or vegetables in the fields. Farmers also have a very important role in fulfilling food needs. Like chicken or duck farmers, where the results of their livestock are used to fulfill nutritional needs. Even the existence of several MSMEs also depends on the life and agricultural products in Indonesia.

Although from this data, the interest of the younger generation to become farmers is still low. However, the agricultural sector has proven to be the most resilient sector to survive the monetary crisis experienced by Indonesia (Situmeang, 2014, p. 126). The strength of the agricultural sector that continues to survive cannot be separated from the development of the times. Especially in the issue of the development of information and communication technology. If we look at the geographical side of where farmers live, they certainly live in rural areas where knowledge of various information cannot be fulfilled (Burhan, 2018, p. 234-235). Whereas the use of information and communication technology is not only limited to sending messages, reading news, or playing games. Instead, users can add insight and knowledge through a variety of content created by each user. Especially knowledge related to agricultural development and product sales.

The use of this technology can help farmers and breeders in creating direct selling value from the results they get (Burhan, 2018, p. 235). Whether increasing knowledge or efforts to get the selling value of agricultural products, this happens because the technology is able to present electronic agriculture (e-agriculture). E-agriculture is a field that focuses on improving agricultural and rural development through improving communication and information processes (Cangara, 2020, p. 512). This is now important and has an impact on the lives of farmers because the use of this technology can be the basis for fulfilling farmers' needs for information.

In addition, Cangara (2020, p. 513) also explained that in a survey conducted by the Human Resources Research and Development Agency of the Ministry of Communication and Information Technology in ten provinces involving 800 respondents, it showed that the level of information and communication technology literacy, both for farmers and fishermen, was still low. In fact, in order to develop business, both in terms of quality and business results, it is necessary to understand the use of technology. This is a problem faced by Indonesia today, regardless of the low interest of the younger generation to become farmers or the vast land that can be utilized by the community.

In order to build resilient human resources, including raising awareness for the younger generation to engage in agriculture, media literacy activities are needed as a form of development communication practice. Media literacy here refers to a broad set of competencies around the use of digital media resulting from the emergence of today's internet-based technologies (Leaning, 2019, p.4). Adjustment through media literacy in this area is inevitable, because the development of information and communication technology has led to a new revolution or digital revolution that is able to re-engineer the way a person

lives (Reddy, Sharma, & Chaudhary, 2020, p. 66). This also aims to support the agricultural sector to increase food production for social and environmental purposes, especially in supporting the Sustainable Development Goals (SDGs) program (Waldron et al., 2017, p. 1).

The use of digital media to support the agricultural sector is inseparable from the sharing facilities offered through new media. This makes the collaboration of everyone very important, especially in realizing the practice of development communication in the agricultural sector. Thus, this article aims to explain the role of information and communication technology as an effort to strengthen the agricultural sector in the perspective of development communication. Thus, The practice of community collaboration in this sector through new media is an important thing to pay attention to. In this case, the role of media literacy is important as a practice for society, especially farmers, in utilizing the technology they have to improve their standard of living. Because with information technology mediated by the internet, farmers can search for the information they need to solve their problems. This also serves as a means of agricultural extension known as cyber extension.

II. Literature Review

Development communication can be seen as a reciprocal message exchange activity between all parties involved in a development effort (Situmeang, 2014, p. 127). Development communication can be done in the form of agricultural extension to achieve the mission of increasing food production and community development in agriculture (Sadono, 2008, p. 65). Extension is basically a very important activity when talking about the development communication process. This is because in the development communication process, the main target to be achieved is to improve the quality of human resources. In particular, to make the audience more resilient in their efforts to improve their economy.

Development communication in agriculture is one of the important national issues because there are several factors that make agricultural development in Indonesia weak (Jaya, 2018, p. 197). These factors include post-harvest, facilities and infrastructure, farmers' attitudes and mentality, level of knowledge, mastery of technology, access to capital, land ownership, and skill level. Based on the factors that make agricultural development weak, some can be overcome through agricultural development communication strategies. It aims to increase farmers' knowledge and abilities in various ways, especially in mastering technology to support agriculture.

In an effort to carry out effective agricultural development, participation activities between various parties need to be carried out. In this participation process, communication becomes the main thing because there is a motive to realize a message conveyed (Sidharta et al., 2021, p. 231). One of the message motives built in the communication process in agricultural development is related to the process of change that occurs in individuals and communities in this field (Vintarno et al., 2019, p. 92). Currently, the process of individual and community change does not only occur through the effects of the environment. Rather, the use of technology has played a very important role in the process of community development.

Regarding various agricultural development research findings, one thing that can be taken into consideration is the use of information and communication technology

for agricultural economic development. Basically, the use of this technology is not only able to develop the economy, but in several developing countries it is also used to alleviate poverty (Burhan, 2018, p.236). Thus, the use of information and communication technology has the potential to strengthen agricultural development communication activities, not only on a development scale. But to improve the standard of living of farmers. This can be seen from the development of digitalization. Where farmers have the opportunity to develop e-commerce according to the products they have. They can even increase their knowledge in the realm of raw material production. This can be done by every farmer to increase the selling value of their products, so that economic improvement can be achieved in accordance with the wishes of the farmers.

III. Methodology

This research uses a qualitative approach. The method used was a literature study. The researcher collected data sources related to the topic of digital literacy and agricultural development in Indonesia. These data were used to understand the role of digital literacy in the context of agricultural development communication.

Articles were collected by searching databases through available literature sources. Research was carried out by analyzing journals and making summaries to build arguments based on previous research results. Article searches were used via Google Scholar and reference books related to development communication.

The considerations in selecting the research data used are filtering according to the topic being written. Researchers focus on data sources for articles related to agriculture and digitalization, including the topic of cyber extension. This is because digitalization is seen as having the potential to encourage the growth of farmer interest in society. Apart from that, digitalization is also able to develop human resources for farmers to achieve a better standard of living.

IV. Discussion

a. Digital Literacy and Farmer Development

In the digital era, one of the requirements of a resilient society is to have good digital skills. Digital literacy is a mandatory requirement that must be possessed so that technological advances can be utilized properly. This also applies to farmers. In general, farmers spend a lot of time in the field to carry out agricultural, plantation or livestock activities. However, farmers still have to participate in the development of technological advances to remain resilient in facing competition in the digital era. Farmers must have the skills and fulfill the aspects of good media literacy.

Various educational institutions, governments, and communities have formulated components of media literacy indicators. According to Monggilo, Kurnia, & Wirawanda (2021), individuals who have digital media skills are considered capable of knowing, understanding, using hardware and software in the digital landscape. Then, individuals are also able to use information search engines and social media conversation applications, digital wallet applications, marketplaces, and digital transactions. The National Cyber and Crypto Agency (BSSN) offers five digital literacy competencies including information data management, communication and collaboration, content creation, digital security, and participation and

action (Monggilo, Kurnia, & Banyumurti, 2020).

Managing information data is the ability to access and evaluate data and information carefully and wisely. Communication and collaboration are the ability to communicate and collaborate ethically with other citizens. Content creation is the ability to edit and produce digital content for good purposes. Digital safety is the ability to protect one's privacy and security from various digital threats. Participation and action are the ability to utilize digital media to be empowered and more valuable together (Monggilo et al., 2021, p. 7).

Digital literacy skills of farmers can be interpreted as the ability of farmers to keep up with the development of information and communication technology and utilize the media to find and use farming information (Yulida, Rosmita, Kurnia, Andriani, & Restuhadi, 2020, p. 309). The digital literacy skills that farmers need to have are, first, having the ability to access and evaluate information data related to agriculture properly. New media allows everyone to create and disseminate various information. A lot of information and knowledge can be accessed easily on digital media. This information will be very useful if it can be processed and utilized in farming. Information and communication technology using the internet is needed in the agricultural sector to increase the productivity of agricultural businesses.

The ability to access and evaluate information is the first requirement that farmers must have. Currently, technological developments in the world of extension are growing. There are technologies that provide unlimited accessibility of information in cyberspace (Farida, Sumardjo, Anna, & Prabowo, 2023). The inability to access information will make farmers disconnected with the advancement of digital media. New media platforms encompass diverse search engines like Google, Yahoo, Baidu, Microsoft Bing, and others. Search engines can make it easier for farmers to get the information they need.

Second, communication and collaboration. New media makes it easy for users to connect and network with each other. Media users can communicate across time and space. So this convenience will be very useful if it can be optimized by farmers. They can connect and network with each other through various media conversation applications such as Whatsapp, Facebook, Instagram, and others. Success in the digital era cannot be separated from collaboration. Resilient farmers in the digital era cannot just rely on their own abilities. There needs to be collaboration between fellow farmers, government, communities, and others. Collaboration will increase the opportunity for farmers to sell their products to a wider target market than the conventional model. Farmers are expected to use smartphones for farming purposes such as sharing information on social media groups either on Facebook or WhatsApp. Joining farmers in groups that discuss palm oil news can add insights that can be applied by farmers related to their farms (Darmayanti, Yulida, & Arifudin, 2023).

Third, content creation. This skill is useful for creating good and useful content for farmers. Content is the spirit of digital media. Farmers can not only be consumers. They can create content that is useful for the wider community. The information and knowledge that farmers have will be very useful if it can be created well. Content creation can change the bad stigma that has been brewing about the farming profession.

Fourth, digital security. This ability is very important to survive in the digital era. Digital media is not completely safe. There are still loopholes for criminals. For this reason, farmers must be vigilant when in the digital space. Starting from protecting personal information, being smart in understanding and criticizing false information, to being careful of all forms of crime in the form of fraud that often occurs in the digital space.

Fifth, participation and action. Sitting still, observing, and enjoying the convenience provided by the digital space is not the right attitude. Farmers must have the ability to utilize digital media for data and value. Participation and action are important. Farmers can actively participate in the digital space. Participation and action are the ability to utilize digital media to be empowered and more valuable together. Digital wallet applications, marketplaces, and digital transactions are features that will make it easier for farmers to make better contributions.

b. Digital Literacy as a Farmer Education Program

Digital literacy is very important, because the ability to master information technology is an important element in the process of cultural, economic, political and social change (Nurhayati & Falah, 2020, p. 349). Efforts to educate the public are made by all elements of society, government, formal education institutions, and so on. Good digital literacy skills can be taught both individually and in groups.

Digital literacy education must start at various levels of society, from early childhood, adolescence, to adulthood. So far, the use of the internet and digital technology is still mostly used to find entertainment and communicate through social media. People get more negative impacts from using internet access. Many people already know the sophistication of digital technology, but they do not realize that the internet can also be used to improve their welfare. The lack of knowledge and ability of the community regarding digital literacy can cause problems because the community has not been able to use and utilize the internet and digital technology properly and wisely, especially in an effort to increase community economic empowerment (Nurhayati & Falah, 2020). The farming community must be able to utilize the internet and digital technology wisely and well. That way, they can increase economic empowerment in the community from the farming side.

Based on the results of Nurhayati and Falah's research (2020, p. 357), digital literacy workshop activities can increase knowledge and understanding of digital literacy. This knowledge can make a positive contribution to improving the community's economy, namely increasing entrepreneurial skills. Digital literacy education programs can not only be carried out by the government constitutionally. Digital literacy education programs can also be conducted among fellow communities. Digital literacy education programs for farmers can be in the form of training seminars and workshops. Digital literacy skills that can be useful for business actors are the ability to access information in digital media, strategies for running online businesses, techniques for creating marketing content.

Practically, farmers can access information regarding ways to increase crop yields. There is a lot of information floating around on the internet that helps farmers increase their product yields. Internet also provides information about online strategies to sell crop yields.

c. Collaboration, Use and Utilization of E-agriculture with a Development Communication Perspective

The role of development communication basically aims to contribute to the development process, especially to accelerate the process of innovation diffusion. The demands of modernization can be met through the diffusion of innovation in development. The new paradigm of development communication is characterized by the realization that the communication process in development must be guided by the community's ability to plan, implement, and evaluate development. The community is not the object of development, but the subject of development, therefore community participation is a very important factor. Communication is carried out convergently and communication interaction is carried out in a more democratic and participatory manner (Setyowati, 2019, p. 188). Farmers must actively participate in becoming the subject of development. Farmers cannot just wait but must pick up the ball for opportunities to contribute and be empowered.

During this time, community involvement is only seen in a narrow context, the community is only considered as a recipient of development innovations, without being involved in planning and decision-making and not developed creative power from within themselves and must accept decisions that have been taken by outsiders. As a result, the community is dependent on other parties, not empowered and independent (Setyowati, 2019: p.p. 189). During this time, farmers still often depend on the extension mode provided by the government to improve agricultural yields. Farmers can also be agents who are the subject of education for fellow farmers. So that the diffusion of innovation can run quickly in accordance with the new development communication paradigm.

One of the strategic and important roles of agricultural extesion activities is to improve the welfare of rural communities So far, the level of farmer satisfaction with extension activities is still low due to less than optimal interaction with extension workers (Farida et al., 2023, p. 197). The presence of digital media makes extension activities need to be improved not only about the usual farmer info. Extension workers must be involved in educating the community regarding digital literacy skills.

Extension activities can also be carried out through an online system so that it does not have to be done face-to-face or in the field. Exchange of information and problems between farmers can be done even though an extension agent is not in the field. The extension system that has become a new internet-based paradigm is cyber extension. This system can break the boundaries of distance, space, and time. The literacy skills of an extension worker towards cyber extension is very important because the availability of good extension data and information can support agricultural extension activities. Extension workers are expected to filter information based on the needs of farmers (Farida et al., 2023, p. 197). There are many conveniences offered by information and communication technology to educate and help maximize farming potential.

E-Agriculture is an information and communication technology service concept developed with the aim of improving information and communication processes in the agricultural sector. E-Agriculture involves the conceptualization, design, development, evaluation, and implementation of several innovative ways to use ICT in rural areas. This

e-Agriculture development initiative is part of one of the development focuses of the Food and Agriculture Organization (FAO). E-Agriculture.org is an internet platform to enhance the sustainable development of the agricultural sector in order to improve world food security developed by FAO (Santoso, Rachmat, Delima, & Wibowo, 2020, p. 41). The basic concept of E-agriculture presents a new paradigm in decision-making and information dissemination related to quotas and commodity products produced every certain period of time. Data representing the "real world" can be stored processed in such a way that it can be presented in a simpler form as needed (Rosita, 2007, p. 7).

E-Agriculture will help farmers in improving the quality and quantity of agricultural products. Information technology can be utilized to support the process of mapping agricultural land. Web Mapping System (WMS) is one of the web-based software systems that can assist in mapping land areas. The application of WMS as one of the implementation areas of information technology is needed (Santoso et al., 2020, p. 40). There are many types of web applications that provide secondary agricultural data in Indonesia. Some of them are Ina-Geoportal (tanahair.indonesia.go.id), sigap (sigap.menlhk .go.id) and others.

The government and the community must collaborate together so that E-agriculture can be used and utilized properly. In accordance with the development communication paradigm, the obligation to educate is not only imposed from the government to the community. However, collaboration between the government and the community, as well as collaboration between fellow communities is needed. In order for the community to utilize the existing digital media.

One form of collaboration in utilizing e-agriculture is cooperation in dividing roles between the government and farmers. The government is not a controlling component, but the government is a facilitator who helps farmers in utilizing e-agriculture. Meanwhile, farmers can be subjects who provide input to the government. Apart from that, this collaboration can also be carried out from the first moment starting from technology-based land data processing. Where farmers and the government carry out this program together.

VI. Conclusion

Digital literacy skills that farmers should have include information data management, communication and collaboration, content creation, digital security, and participation and action. Farmers must be able to utilize the internet and digital technology wisely and well. That way, they can increase economic empowerment in the community from the farming side.

Digital literacy education programs can not only be carried out by the government constitutionally. Digital literacy education can also be carried out by fellow communities. Digital literacy education programs for farmers can be in the form of training seminars and workshops. Digital literacy skills that can be useful for business people are the ability to access information in digital media, strategies for running online businesses, techniques for creating marketing content.

Based on the perspective of development communication, farmers must actively participate in becoming the subject of development. Farmers cannot just wait but must pick up the opportunity to contribute and be empowered. There are many conveniences offered by information and communication

technology to educate and help maximize the potential of farming, one of which is E-Agriculture. E-Agriculture will help farmers improve the quality and quantity of agricultural products. There are currently many types of web applications that provide secondary agricultural data in Indonesia. Lastly, collaboration among the government, the community, and fellow communities is needed. In order for the community to utilize the existing digital media.

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RESEARCH ARTICLE

Addressing Educational Disparities in the Philippines: An Examination of the Impact of Alternative Delivery Modes (ADMs) on Achieving Inclusive and Quality Education

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Abstract

The United Nations established seventeen Sustainable Development Goals (SDGs) in 2015, and nearly every country, including the Philippines, pledged to pursue them. Among these goals is SDG 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Recognized as a fundamental human right, the attainment of quality education extends beyond mere accessibility. Unfortunately, the Philippines continues to grapple with providing inclusive high-quality education to its populace. This study undertakes a thematic analysis of data gathered from previous studies and literary works to analyze the impacts of alternate delivery modalities (ADMs) in the Philippines' pursuit of inclusive and high-quality education. Specifically, the research explores the perspectives of parents, teachers, and students on various aspects of ADMs, seeking to shed light on their effectiveness in addressing educational disparities. The findings of the study bring to the forefront significant challenges associated with the integration of ADMs in the educational landscape. Among these obstacles are the inadequacy of essential resources, limited teacher communication, and an increased workload that places emotional strain on teachers. These difficulties have notable implications for student motivation, interest, and overall learning outcomes, particularly for students coming from low-income backgrounds. Addressing these urgent concerns and adhering to the SDG 4 targets for 2030, this research provides tangible recommendations and viable solutions. By acknowledging and actively tackling the challenges that ADMs face, the Philippines may get closer to attaining its goal of delivering inclusive and high-quality education to all its residents.

Keywords: e Sustainable Development Goal 4 (SDG 4), alternative delivery modes (ADMs), inclusive education, quality education, Philippines, COVID-19 pandemic, Filipino children

I. Introduction

Education is universally recognized as a fundamental right and a powerful catalyst for individual empowerment, societal progress, and sustainable development. The United Nations' Sustainable Development Goal 4 (SDG 4) specifically calls for the provision of inclusive and quality education for all, aiming to ensure that every child receives a fair chance to thrive and contribute to their communities. While significant progress has been made worldwide, challenges persist, particularly in developing countries such as the Philippines. Recognizing the crucial role of education in shaping the nation's future, the Philippine government has implemented various policies and initiatives to promote inclusive and quality education. However, despite these efforts, data show that the country remains midway through achieving the SDG 4 objectives (Baclig, 2023). Moreover, according to the United Nations Development Programme (UNDP) (2020), the country's progress in achieving the SDGs was adversely affected by the COVID-19 pandemic, with the progress on some goals, including SDG 4, being reversed.

The global spread of the COVID-19 pandemic had a dramatic impact on practically every facet of life, including education (Calimlim, 2020). In response to the health and safety concerns posed by the pandemic, schools around the world were forced to close their doors and transition to remote learning modalities. The Philippine Department of

Education (DepEd) implemented the Basic Education - Learning Continuity Plan (BE-LCP) as a response to the pandemic's disruption of traditional classroom-based instruction (DepEd, 2020). It covers the essential education requirements during the COVID-19 pandemic, including the use of alternative delivery modes (ADMs). ADMs include online distance learning, modular learning, and blended learning approaches. These modes are tried and tested within the formal system that enable schools to provide quality education to marginalized students and those at risk of dropping out (Llego, 2020), aiming to ensure that education reaches all students, regardless of their circumstance.

The implementation of ADMs in the Philippines has opportunities and challenges. On one hand, ADMs allowed the education to continue amidst the pandemic , providing flexibility and accessibility for students who may face barriers to traditional in-person learning. On the other hand, the delivery of ADMs encountered various problems , highlighting the need for further analysis and improvement. There have been concerns and challenges raised by stakeholders. Many children, particularly those in important developmental phases, have suffered in this setup, as it has forced them to enroll in distance-learning modalities, which may not adequately meet their educational and socio-emotional needs (UNICEF, 2021). Parents, students, and teachers have expressed difficulties associated with remote learning, such as rising expenses, mental health concerns, and high dropout rates (Joven, 2021). Despite other countries gradually reopening schools after a year of closure, the Philippines has remained one of the few countries that have not done so (Joven, 2021).

However, on November 15, 2021, the DepEd allowed a limited re-opening of 120 elementary and high schools in areas with low COVID-19 cases, marking a small step toward the resumption of face-to-face classes (Wui, 2022). Subsequently, on November 2, 2022, DepEd announced that all schools providing basic education should have transitioned to full face-to-face classes (Mingoy, 2022). Nevertheless, due to recent complaints about the extremely high heat index in the country, DepEd has granted principals and school heads the authority and responsibility to suspend in-person classes and switch to ADMs as needed (Reyes, 2023).

Given the complex landscape of education delivery in the Philippines during the COVID-19 pandemic, there is a need to conduct a thorough analysis of the effectiveness and impact of ADMs on Filipino children. This study aims to conduct a thematic analysis of the use of ADMs in the Philippine education system, revealing the gaps in the conceptualization, implementation, monitoring, and assessment of these modes during the pandemic. This study also aims to shed light on the constraints that impede the attainment of SDG 4 targets and offer insights for successful policy interventions by examining the opportunities and obstacles presented by ADMs. The importance of this research stems from its potential to inform educational policymakers, administrators, and stakeholders about the strengths and drawbacks of ADMs, allowing them to make evidence-based decisions to improve the quality and inclusivity of education during crises and beyond. The findings are expected to contribute to a more thorough understanding of emergency instructional methods and provide significant insights for improving educational practices in similar circumstances around the world. Ultimately, this comprehensive study provides concrete recommendations that will help achieve SDG 4 and ensure that all Filipino children receive a quality education.

II. Methodology

Amidst the COVID-19 outbreak, this rapid review focuses on basic education in the Philippines, specifically examining the impact of ADMs on the academic achievements, psychosocial well-being, and future prospects of Filipino children. Additionally, the study explores the implications of these findings for the country's progress on SDG 4. Conducted with the aim of swiftly and effectively assessing the effectiveness of ADMs during the pandemic, the research incorporates diverse perspectives and findings to align with its objectives and enhance the analysis's rigor within the Philippine education system.

Inclusion Criteria	Exclusion Criteria
• *Timeframe*. Texts published from March 8, 2020, up to the present. • *Geographic Focus*. Texts specifically related to and explicitly discussing basic education in the Philippines. • *Relevance to ADMs*. Texts that explore, evaluate, or discuss ADMs for basic education during the COVID-19 pandemic, including blended learning, distance learning, online platforms, printed modules, TV and radio programs, and other innovative approaches implemented during the outbreak. • *Relevance to COVID-19*. Texts that directly address or discuss the impact of the COVID-19 outbreak on basic education and the adoption of ADMs as a response to the pandemic. • *Document Types*. Peer-reviewed research studies, government publications, news articles and reports from reputable organizations, and official documents. • *Methodologically Rigor*. Texts that follow the four criteria of Oketch et al. (2014): Focus, Transparency, Appropriateness, Validity & Reliability of Conclusions.	• *Irrelevant Topics*. Texts that mention but do not directly address ADMs for basic education in the context of the COVID-19 outbreak in the Philippines. • *Duplicate or Repetitive Studies*. Texts reporting similar findings from the same research project or data source, prioritizing the most recent or comprehensive version. • *Non-English and Filipino Languages*. Texts published in languages other than English and Filipino. • *Incomplete, Not Reputable, or Non-Peer-Reviewed Sources*. Texts that do not meet the standard academic quality or rigor.

Tab. 1. Inclusion/Exclusion Criteria
Source: Author
Notes: It provides an overview of the Inclusion/Exclusion Criteria used to determine which texts are relevant and meet the requirements for inclusion in the study.

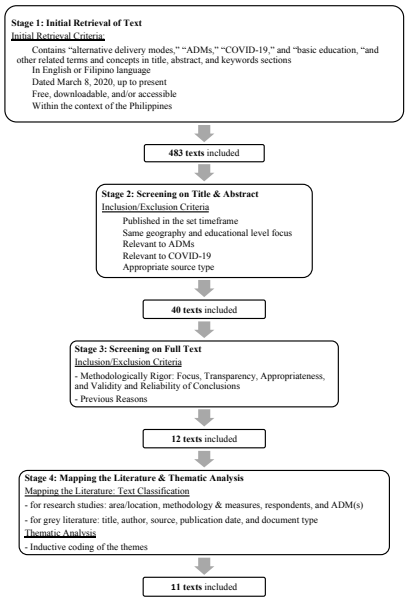

Fig. 1. Flow diagram of the systematic review process
Source: Author (adapted from Sakata et al., 2022)
Notes: It illustrates the process of retrieving, screening, and analyzing the texts in this study.

a. Stage 1: Literature Retrieval

The rapid review was initially conducted using a dual approach. The first step was to use the EPPI-Reviewer, a widely used tool for conducting reviews. However, the database had limitations in terms of relevant literature for this study. To guarantee diversity and relevance, a manual review was conducted to include a broader range of literature sources, such as studies, and grey literature such as policy documents, reports, and articles. This combined method made it possible to get a more diverse and thorough assortment of texts.

For research studies, the following credible databases were used: ResearchGate, ScienceDirect, PubMed Central, EBSCOhost, ProQuest, SpringerLink, Taylor & Francis, and Google Scholar. Google Chrome was employed for accessing grey literature. The inclusion of grey literature from reputable sources sought to improve the validity and dependability of

the research findings by providing a solid foundation based on reputable and up-to-date material.

The researcher searched for terms related to the topic such as “alternative delivery modes,” “ADMs,” “basic education,” “COVID-19,” and “Filipino education” and used Boolean operators to increase the combined multiple search terms and input the year scope for the overall efficacy of the search range. For a source to be included, it must be written in English or Filipino language and written/published from March 8, 2020, when Former President Rodrigo Duterte declared a state of public health emergency due to COVID-19 (Cabico, 2023) up to the present. It should contain the related terms and concepts in the title, abstract, and/or keywords section. It also must be free, downloadable, and/or accessible—with or without institutional access provided by the Ateneo de Manila University. It should also be centered on basic education and ADMs during the COVID-19 outbreak and is within the context of the Philippines. All the downloaded texts were saved into a Google Drive folder labeled ‘Stage 1,’ while grey literature sources were bookmarked instead.

b. Stage 2: Text Screening

In Stage 2, the inclusion/exclusion criteria were applied during the screening process to select the most relevant texts for the rapid review. The criteria were based on the research's focus and objectives, ensuring that the selected texts pertained to basic education and ADMs during the COVID-19 outbreak in the Philippines. To be included, a source had to be written in English or Filipino and written/published from March 8, 2020, when Former President Rodrigo Duterte declared a state of public health emergency due to COVID-19 (Cabico, 2023) up to the present. The related terms and concepts had to be present in the title, abstract, and/or keywords section. Additionally, the texts had to be freely downloadable and/or accessible, with or without institutional access provided by the Ateneo de Manila University. All relevant texts meeting these criteria were saved and bookmarked into a Google Drive folder and Chrome labeled ‘Stage 2.’

c. Stage 3: Text Evaluation

In this stage, the main body of each text was carefully read to determine if it met the methodological rigor criteria, including Focus, Transparency, Appropriateness, and Validity & Reliability of Conclusions, as outlined by Oketch et al. (2014). The researcher also considered any reasons for inclusion that may have been missed in Stages 1 and 2. The texts meeting the methodological rigor criteria were saved or bookmarked in another folder named "Stage 3" in Google Drive and Chrome.

d. Stage 4: Text Categorization and Analysis

Stage 4 involved thoroughly reading each of the selected texts, divided into two phases. The initial phase was dedicated to categorizing the texts based on key criteria. For research studies, the categories included area/location, methodology & measure, respondents, and ADMs. For grey literature, the categories comprised title, author, source, publication date, and document type. This categorization process allowed the researcher to provide a basic summary of the important characteristics of the texts that were included in the review, thereby mapping the literature (see Tables 2&3).

	Area/Location	Methodology & Measure	Respondents	ADM(s)
Constantino et al., 2020	Cabanatuan City	Quantitative; Survey	Parents	Online Distance Learning, Modular Distance Learning, and Blended Learning
Kintanar et al., 2021	Sibonga Cebu	Quantitative; Survey	Parents	Modular Distance Learning
Tan et al., 2022	Northern Samar (San Isidro), Samar (Marabut & Basey), and Leyte (Tacloban City)	Qualitative; Interview	Parents	Modular Distance Learning
Collado et al., 2021	not specified	Quantitative; Survey	Parents	Modular Distance Learning
Talimodao & Madrigal, 2021	highly urbanized city in Central Philippines	Quantitative; Survey	Teachers	Modular Distance Learning
Dilna et al., 2022	Datu Odin Sinsuat South District in Maguindanao ll Division	Quantitative; Survey	Teachers	Modular Distance Learning
Guiamalon et al., 2021	Buluan, Division of Maguindanao I	Quantitative; Survey	Teachers	Modular Distance Learning
Toquero, 2021	Mindanao	Qualitative; Interview	Teachers	Online Distance Learning, Modular Distance Learning, Blended Learning, and TV/Radio-based Instruction

Tab. 2. Mapping the Literature: Text Classification for Research Studies
Source: Author
Notes: The table is presented to give the reader a basic picture of the sorts of pieces of literature that have been undertaken. It illustrates some of the key characteristics of the texts examined in this study.

Title	Author	Source	Publication Date	Document Type	ADM(s)
Remote learning isn't working for Filipino families	Julienne Joven	CNN Philippines	September 8, 2021	news article	Online Distance Learning, Modular Distance Learning, and Blended Learning
Fourth Quarter 2020 Social Weather Survey on Learning Delivery Modalities (Part 2): 58% of enrolled school-age Filipinos use devices for distance learning	Jose Miguel Alberto M. Carlos, Leo S. Laroza, and Asherel Joy D. Zaide	Social Weather Stations	March 1, 2021	research report	Online Distance Learning, Modular Distance Learning, Blended Learning, and TV/Radio-based Instruction
The Philippines Still Hasn't Fully Reopened Its Schools Because of COVID-19. What Is This Doing to Children?	Chad De Guzman	TIME	December 1, 2021	news article	Online Distance Learning and Modular Distance Learning

Tab. 3. Mapping the Literature: Text Classification for Grey Literature
Source: Author
Notes: The table is presented to give the reader a basic picture of the sorts of pieces of literature that have been undertaken. It illustrates some of the key characteristics of the texts examined in this study.

In the second phase of Stage 4, the primary objective was to discern and elucidate the prevailing themes arising from the extant textual materials. This process involved iterative and meticulous efforts to systematically organize the identified categories and sub-categories, culminating in the establishment of a cohesive analytical framework. The researcher adopted an inductive thematic analysis approach to carry out this investigation, aligning with the broader method of qualitative synthesis as expounded by Bearman and Dawson (2013, as cited in Bremner et al., 2023). Under this method, an exhaustive examination of the texts was undertaken, whereby themes naturally surfaced during the scrutiny. Following this, each text was methodically coded and grouped according to its corresponding themes. Subsequently, the researcher meticulously reviewed the coded contents within each theme on multiple occasions, synthesizing the information derived from them.

By following this comprehensive methodology, the rapid review aimed to provide valuable insights into the effectiveness and impact of ADMs in the Philippine education system during the COVID-19 pandemic. The findings will be instrumental in informing educational policymakers, administrators, and stakeholders about the strengths and weaknesses of ADMs, enabling evidence-based decisions to enhance the quality and inclusivity of education during crises and beyond. Furthermore, this research contributes to the broader understanding of

education in emergencies and offers valuable lessons for improving educational practices in similar contexts worldwide, ultimately advancing the achievement of SDG 4 and ensuring quality education for all Filipino children.

III. Results and Discussion

This section presents the synthesized findings of the review. The methodology described in the Materials and Methods section was followed, which involved conducting an inductive thematic analysis of the themes that emerged from the 11 included texts.

a. Education during the Pandemic

Parents applaud the DepEd efforts to establish online distance learning, modular learning, and blended learning, as these initiatives have allowed their children to continue their education. Educators, on the other hand, are concerned about the prolonged closure of schools and the negative influence on children's capacity to learn. This, in turn, has an impact on their future prospects, especially given the country's reliance on a youthful and well-educated population to restore pre-pandemic economic growth.

b. Digital Divide in Education

The utilization of desktops or laptops for online learning emerged as an indispensable necessity in the realm of education, particularly in response to the exigencies of the pandemic. Nevertheless, it is crucial to acknowledge the existence of a pronounced digital divide in this context (Collado et al., 2021).

As of the last quarter of 2020, the extent of device usage for distance learning among Filipinos aged 5 to 20 displayed considerable variability, with nearly half of this demographic lacking access to such devices (Carlos et al., 2021). It was observed that device adoption rates were higher in Metro Manila and urban areas, and this trend seemed to be correlated with the educational attainment level of the household head (Calimlim et al., 2021). In rural areas, there was a more pronounced inclination towards acquiring smartphones, while desktops or laptops were more commonly procured in urban settings, especially among individuals with college degrees (Carlos et al., 2021). Notably, families residing in rural areas faced the challenge of expending a significant portion of their average monthly income in the Philippines to secure smartphones for their children who were engaged in distance learning (Collado et al., 2021). This financial burden was particularly consequential for low-income families, adversely impacting students' ability to fulfill their homework assignments (Calimlim et al., 2021).

Efforts were made by government agencies to provide support in mitigating this divide, including the donation of confiscated phones and gadgets to the education department. However, despite these endeavors, the digital divide remains a formidable obstacle that necessitates further attention and intervention (Carlos et al., 2021).

c. Internet in Education

Internet access has the potential to increase educational quality, particularly when face-to-face instruction is not possible. However, access to the internet continues to be a serious barrier, particularly in rural areas with unstable connectivity (Carlos et al., 2021). Additionally, the internet in the Philippines is among the least stable and slowest, while also

being the most expensive when compared to other countries (Baclig, 2023). This limits teachers' ability to conduct lectures using video conferencing services or Facebook Live (Carlos et al., 2021). The high cost and instability of internet services impede the efficient introduction of other modalities of delivery (Baclig, 2023).

d. Parents as Collaborators, Teachers, Students, and Administrators in Education

Parents have become collaborators in their children's education since it is no longer confined to the classroom. They are attempting to co-teach alongside teachers, with some finding it rewarding and others viewing it as a chore (Constantino et al., 2020). Balancing work, family, and teaching responsibilities presents challenges for parents (Toquero, 2020). Due to school closures, many parents were obliged to work remotely or forego jobs in order to care for their children and support them with their education (De Guzman, 2021). Parents face challenges when teaching disciplines they are unfamiliar with, like mathematics, and frequently struggle with time management and financial constraints (Constantino et al., 2020). To overcome these obstacles, they seek assistance from teachers as well as internet tools (Toquero, 2021). Additionally, parents have taken on administrative responsibilities such as class scheduling, module pick-ups, and setting up a classroom environment at home, adding to their workload and time management challenges (Kintanar et al., 2021). In some cases, parents even answer modules on behalf of their children to expedite completion (Constantino et al., 2020).

e. Lack of Motivation

One significant challenge pointed out by parents is the lack of learner motivation. Students' ability to complete modules is sometimes hampered by laziness and distractions (Tan et al., 2022). To solve this difficulty, some parents turn to paying rewards or allowing breaks (Constantino et al., 2020). Maintaining a consistent weekly schedule is critical in teaching students the value of time management, scheduling, and meeting deadlines (Tan et al., 2022). However, due to school closures and the perception of a break from traditional schooling, many children refuse to follow a typical school routine and instead engage in hobbies like gaming or watching movies (Tan et al., 2022).

f. Loss of Student Interest

The shift to ADMs has resulted in a loss of interest among students. Disengagement is exacerbated by factors such as poor internet connections, a lack of teacher feedback on take-home modules, and the blurring of the lines between home and school life (Cabico, 2023). The overwhelming quantity of activities and limited social relationships reduce students' enjoyment of learning even further (Joven, 2021). Identifying and addressing these issues is critical to maintaining student interest and active participation in alternative learning modalities.

g. Lack of Essential Resources

Low-income households have limited access to essential resources like gadgets, computers, and internet connections, which makes effective participation in ADMs difficult (Llego, 2020). Children from low-income households are at a disadvantage since they cannot afford these devices or dependable internet connectivity (Collado et al., 2021). These students may struggle to stay up with the curriculum and access educational materials if they do not have the essential tools and technologies, potentially perpetuating a cycle of poverty (Llego, 2020).

h. Increased Workload and Emotional Strain on Teachers

Due to the change to ADMs, teachers experience heavier workloads and emotional strain (Dilna et al., 2022). Long hours and stress are exacerbated by additional administrative tasks, such as modifying teaching materials, assessing student work, and meeting deadlines (Dilna et al., 2022). Additionally, teachers face difficulties in meeting the educational needs of students with Special Educational Needs and Disabilities (SEND) (Sakata et al., 2022). Teachers' well-being suffers as a result of the additional burden, which causes stress, weariness, and emotional suffering (Dilna et al., 2022). Despite the challenges, teachers stay committed to providing the best education possible, frequently at the expense of their personal time and well-being (Dilna et al., 2022).

i. Limited Teacher Communication

With ADMs, effective communication between teachers and learners is hampered (Sakata et al., 2022). In traditional classrooms, students can directly ask their teachers questions or seek explanations. This direct channel of contact, however, is disrupted in ADMs, impeding the learning process (Sakata et al., 2022). Difficulties in obtaining prompt responses to questions can hamper comprehension and engagement with the lessons (Sakata et al., 2022). Real-time interactions allow teachers to assess students' comprehension and provide timely interventions or further support as needed (Sakata et al., 2022).

Education has experienced substantial alterations during the pandemic, focusing on new modalities such as blended learning and modular modes for facilitating continuous learning. These initiatives have enabled students to complete their studies while also exposing serious limitations. There is a significant digital divide, with many students missing access to essential gadgets and reliable internet connectivity. Low-income households, particularly those in rural areas, suffer disproportionately, making effective participation in distance learning difficult. Furthermore, when they adapt to new educational modalities, teachers confront increasing workloads and emotional strain. In these exceptional times, efforts to address these difficulties are crucial for ensuring equitable high-quality education.

IV. Conclusion & Recommendations

The research findings shed light on the profound challenges and wide-ranging impact of the COVID-19 pandemic on the country's education system. Recognizing education as a fundamental right, it becomes crucial to explore and implement alternative approaches that ensure continuous learning instead of abrupt disruptions. The concerns raised by educators about the extended closure of schools and its negative effects on students' learning abilities are not only pertinent to the Philippines but also resonate globally, underscoring the urgency to address these issues.

The commendable parental support for the Department of Education's efforts in facilitating online distance learning coexists with legitimate concerns expressed by educators regarding the prolonged school closures and their potential impact on student's academic development and future prospects. The significant digital divide poses a serious barrier, disproportionately affecting students from low-income households in rural areas who struggle with limited access to essential devices and reliable internet connections.

Additionally, the study highlights the critical role of internet access in effectively adopting ADMs. However, high expenses and unstable services create obstacles to the seamless integration of online programs, presenting instructional challenges for educators. Simultaneously, parents have become active partners in their children's education, assuming various roles to enhance the learning process, but they encounter difficulties in effectively motivating and engaging students. The research also notes the increased effort and emotional strain experienced by teachers during the transition to alternative learning methods. The lack of real-time communication with students reduces educational efficacy. Addressing these multifaceted issues is crucial to achieving equitable access to quality education while supporting the well-being of children, parents, and educators.

Proactive initiatives by policymakers, educational institutions, and stakeholders are fundamental in eliminating the digital divide, improving internet access, and providing comprehensive assistance to both educators and students. A more robust and inclusive educational system capable of prospering in adverse situations can be established by accepting evidence-based solutions and promoting a collaborative approach. Future studies should delve deeper into innovative strategies and interventions to maximize the effectiveness of ADMs and foster a thriving educational environment for all.

To enhance the Philippines education system and promote inclusive, high quality education, despite pandemic-related challenges and potential future disruptions, the researcher suggests the following approach that aligns with global discussions on education resilience. Firstly, there is the need to enhance internet connectivity, particularly in rural areas, and establish open communication channels between parents and teachers. Secondly, adequate funding for quality learning materials and continuous support and training for teachers in adapting to ADMs will further enrich the educational experience. Thirdly, it is important to emphasise inclusive policies for individuals with disabilities and promote collaboration among educators, parents, and disability support services to create a nurturing learning environment. It is also important to note that regular assessments of ADM efficacy and feedback will aid in the refining of strategies and policies.

Future researchers are encouraged to prioritize longitudinal studies, mixed-methods approach, intervention evaluations, stakeholder engagement, and the exploration of innovative practices in remote and inclusive education. These evidence-based recommendations align with the international discourse on education resilience and can serve as a framework that may be adapted and applied in other countries confronting similar challenges. By embracing these recommendations, the education system can adeptly navigate challenges and strive towards achieving quality education for all learners while fostering inclusivity and resilience amid uncertainties.

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RESEARCH ARTICLE

Sustainable Futures: Exploring Cenderawasih Bay National Park as Indonesia's Emerging Ecotourism Hub through Life Cycle Sustainability Assessment and Green Theory

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Abstract

This study examined the potential for ecotourism development centered around whale sharks in Cenderawasih Bay National Park. The preservation of Cenderawasih Bay National Park has been officially recognized as a national park and was regarded as a crucial conservation priority in Indonesia. Nonetheless, distinct obstructions and complexities were present during the execution of whale shark ecotourism in Cenderawasih Bay National Park. The implementation necessitated a careful and conscientious approach that adhered to the tenets of responsible and sustainable ecotourism. This research utilized the Life Cycle Sustainability Assessment (LCSA) and Green Theory to examine the ecological, social, and economic implications of the whale shark ecotourism sector in Cenderawasih Bay National Park comprehensively and sustainably. By integrating these two approaches, this research aimed to offer all-encompassing and enduring strategic suggestions for advancing whale shark ecotourism in Cenderawasih Bay National Park.

Keywords: Ecotourism, Whale Shark, Life Cycle Sustainability Assessment (LCSA), Green Theory, Cenderawasih Bay National Park

I. Introduction

Tourism is a significant driver of global economic expansion, representing one of the most rapidly expanding sectors worldwide. The tourism industry has witnessed a significant rise in the popularity of ecotourism, which is characterized by a growing number of individuals who are inclined towards travel experiences that are both culturally authentic and environmentally responsible. In recent years, there has been a notable increase in the number of tourists due to the advancements in globalization (Morales, 2020). The number of international trips individuals undertake exceeds one billion annually, representing a twofold increase from the figures recorded two decades ago. Empirical evidence suggests that tourism on a significant scale has adverse effects on the host community's environment, including heightened pollution levels and degradation of the local ecosystem. It is accountable not only for environmental issues but also for cultural commodification and a decline in the living standards of local communities (Corradi, 2017).

The present study encompasses a discourse on the potential of ecotourism as a means of promoting both the well-being of local communities and the preservation of natural resources. Ecotourism is presently characterized as a form of conscientious travel to natural areas that prioritizes the preservation of the environment, the maintenance of the local community's welfare, and the provision of educational and interpretive opportunities (TIES, 2015). Ecotourism presents a viable solution to the current crisis. If properly executed, ecotourism has the potential to offer an affordable and temporary remedy. The tourism industry in Indonesia exhibits substantial potential and has the capacity to emerge as a noteworthy contributor to the

state's revenue. The Cenderawasih Bay National Park in Papua, Indonesia, boasts the natural tourism potential of whale sharks. The Cenderawasih Bay National Park, spanning 1,453,500 hectares, presents significant opportunities for tourism and environmental conservation efforts, crucial for preserving its natural resources.

The conservation of Cenderawasih Bay National Park has been designated a national park and is considered a crucial conservation priority in Indonesia, as Erdmann et al. (2010) stated. Cenderawasih Bay National Park has diverse ecosystems and resources exhibiting high endemism levels. The pause shark, a marine creature, is frequently observed inhabiting the waters of the Cenderawasih Bay National Park. According to Stewart (2011), in certain nations, sharks' docile and friendly demeanor, coupled with their regular occurrence, has resulted in their loss of status as symbols of marine ecotourism. Unique obstacles and challenges exist during the implementation of whale shark ecotourism in Cenderawasih Bay National Park such as implementing whale shark ecotourism in Cenderawasih Bay National Park poses challenges such as managing visitor interactions to minimize negative impacts, establishing clear regulations to prevent overcrowding and habitat degradation, fostering community involvement and education, and addressing the potential effects of climate change on whale shark behavior. Balancing economic opportunities with environmental preservation is essential for sustainable success. The research aims to assess the ecological viability of Cenderawasih Bay National Park concerning the advancement of ecotourism. This statement explores various aspects, including preserving biodiversity, safeguarding habitats, maintaining water quality, and promoting ecosystem well-being. This research additionally evaluates ecotourism's social and cultural viability of the undertakings carried out within the park. Furthermore, it considers the economic viability of ecotourism endeavors within the park. The study employs the life cycle sustainability assessment framework and green theory to assess the comprehensive sustainability performance of the national park in its capacity as an ecotourism site. Moreover, it furnishes pragmatic suggestions and tactics to augment sustainability.

II. Research Method

a. Location of The Research

The object of this research is located at Taman Nasional Teluk Cenderawasih, West Papua, Indonesia. According to Balai Besar Taman Nasional Teluk Cenderawasih (2023), TNTC has a total area equal to 1.453.500 Ha, with 68.200 Ha of land area, and 1.385.300 Ha of marine area.

b. Variable and Indicator of The Research

This research focused on examining the impact of each variable such as the economic aspect, social aspect, and environmental aspect which is linked to ecotourism at Taman Nasional Teluk Cenderawasih. The definition of operational variables shown in the table below.

Variable	Indicator	Item	Definition	Reference
Environment	□ Species Conservation □ Water Quality □ Resource Sustainability	□ Controlling the number of whale shark ecotourism tourists, monitoring the condition and population of whale sharks, and the marine environment □ SPL (Sea Surface Temperature) □ Salinity □ Pollution in Water □ Marine fuel that is good for the environment	Every aspect of whale shark ecotourism activities, whale shark numbers, and whale shark and marine ecosystem health. This covers water quality, vessel fuel use, and energy consumption in whale shark ecotourism activities.	Ly, 2014
Economy	□ Local Economic Impact □ Sustainability of Finance	□ Jobs for locals □ Increase in local economic income Development of tourism infrastructure □ Operating costs □ Income	Aspects of whale shark ecotourism's contribution to the local economy, including income and all budget spending activities for the improvement or development of ecotourism infrastructure	Ly, 2014
Social	□ Community's Involvement □ Education and Awareness □ Culture Acknowledgement	□ Empowering the community and including the community's role in the ecotourism sector □ HR capacity building in the community □ Cultural, religious, and historical zoning □ Local knowledge on biodiversity management	Aspects of ecotourism that promote the empowerment and welfare of local populations, such as initiatives that raise public knowledge and understanding of the need of whale shark protection and marine environment conservation in general	Ly, 2014

Tab. 1. Definition of Operational Variable
Source: Author

c. Data Collection Method

The author gathered secondary data from previous research and the official website of Taman Nasional Teluk Cenderawasih. To validate this information, semi-structured interviews with experts were conducted to obtain in-depth viewpoints on the results and recommendations for ecotourism at Taman Nasional Teluk Cenderawasih.

d. Data Analysis and Processing

This research used two different methods to analyse the data. The first is, Life Cycle Sustainability Assessment (LCSA) is a methodology to evaluate all sustainability pillars including environmental, social, and economic impacts in decision-making processes in order to create more sustainable outcomes in the life cycle (Life Cycle Initiative, 2023). In the methodology itself, LCSA frameworks consist of four phases, 1) LCSA goal and scope; 2) LCSA inventory analysis; 3) LCSA impact assessment; and 4) Interpretation (Shrivastava & Unnikrishnan, 2021). The second method used in this research is the Green Theory which emerged as a response to the inadequate acknowledgment of environmental issues within international relations. Its objective is to provide fresh analytical and normative perspectives on global environmental transformation (Eckersley, 2013). This theory believes that if in a country there are many members of the population in it then to achieve a sustainable environment or environmental improvement will not be realized, a smaller community is needed. Decentralization, or the transfer of authority and decision-making from central to local level bodies, has certain attractive features, such as self-determination and democratic accountability.

III. Life Cycle Sustainability Assessment & Green Theory

a. Life Cycle Sustainability Assessment of Taman Nasional Teluk Cenderawasih

LCSA of Teluk Cenderawasih started with the planning stage, in which there are numerous steps in the planning stage to assess the Life Cycle Sustainability Assessment, such as identification, objectives, and potential impact. There is data in the identification stage that shows that in 2017 before the issuance of the Long Term Development Plan (RPJP) for Cenderawasih Bay, the whale shark population reached 115 individuals, and after the enactment of the 2018 RPJP – 2027, the whale shark population increased to 180 individuals. Government Regulation Number 12 of 2014 was implemented in Cenderawasih Bay National Park at the goals stage to boost ecotourism. Stakeholders such as the local fishing community, shark specialists, and local government were consulted. Government institutions and non-governmental organizations (NGOs) provided training and job possibilities to some coastal communities. Ecotourism places suited for whale sharks and the marine environment were identified during the planning stage. For ecotourism operators, rules and regulations like visitor

limits, safe distances, and ethical behavior were devised. The 2018-2027 RPJP created standard guidelines to govern visitor activities.

During the implementation stage, ecotourism operators are required to address resource sustainability, such as minimizing fuel and plastic waste. Diesel fuel consumption has significant environmental consequences, such as CO2 emissions and water pollution. There are regulations in place to limit the sulfur content of gasoline and to avoid pollution in the marine environment. In the operational stage, it is critical to monitor the whale shark population and the maritime environment. The presence of whale sharks is influenced by high levels of chlorophyll-a and Sea Surface Temperature. To reduce pollution and safeguard the Cenderawasih Bay tourism zone and whale shark population, efforts must be made. Practical adoption entails taking proactive, preventative, and punitive measures to reduce criminal activity and safeguard the environment. It is critical to include local populations in ecotourism initiatives for long-term sustainability and economic rewards. To facilitate their participation, training, and career possibilities are made available. Collaboration with multiple stakeholders, sustainability review, and repair and maintenance procedures are all part of maintenance. The RPJP 2018-2027 governs joint efforts between the governments of Nabire and Teluk Wondama Regencies, the University of Papua, WWF, Conservation International, and LIPI.

b. LCSA Impact Assessment

The calculation of LCSA is in three prominent aspects such as economic aspect, social aspect, and environmental aspect. The calculation of the impact assessment is shown in the Table. 2.

	Species Conservation	Status		Reference
Environmental	Limiting the number of visitors to whale shark ecotourism	√		RPJP 2018 - 2027 TNTC
	Monitoring the condition and population of whale sharks and the marine environment	√		RPJP 2018 - 2027 TNTC
	Water Quality	**Regulation**	**TNTC**	**Reference**
	SST (Sea Surface Temperature)	18 - 30 Celcius	27 - 32 Celcius	Rowat, 2007, Arip et al., 2017)
	Salinity	26% - 35%	33% - 34%	Keputusan Menteri Lingkungan Hidup 1984 dan 2004
	Water Pollution	1,23625 kg		Ship and spend boat/trip pollution calculations
	Resource Sustainability	**Regulation**	**TNTC**	**Reference**
	Environmentally friendly marine fuel	Biofuel	Fossil	Surat Edaran Direktur Jenderal Perhubungan Laut No. SE.35 Tahun 2019 tanggal 18 Oktober 2019

Tab. 2. Environmental Aspect in LCSA Taman Nasional Teluk Cenderawasih
Source: Secondary Data Processing (2023)

In terms of local economic effect, as indicated in the 2018-2027 RPJP, TNTC has created job possibilities for local citizens. However, new connecting infrastructure and housing facilities are required to encourage tourism in the TNTC area. In recent years, the number of visitors has expanded dramatically, resulting in increased local economic gain. In terms of financial sustainability, TNTC's operational expenditures surpass the company's greatest revenue in 2022. Economic measures must be implemented to promote both the growth of tourism infrastructure and the improvement of the local economy. More information from Table 3 is required for the social aspect.

	Local Community Engagement	Status	Reference
Social	Community Empowerment and involve the role of the community in the ecotourism sector	√	RPJP 2018 - 2027 TNTC
	Education and Awareness	**Status**	**Reference**
	Community training	√	RPJP 2018 - 2027 TNTC
	HR capacity building	√	RPJP 2018 - 2027 TNTC
	Cultural Award	**Status**	**Reference**
	Zoning Culture, Religion, History	√	RPJP 2018 - 2027 TNTC
	Local wisdom related to biodiversity management	√	RPJP 2018 - 2027 TNTC

Tab. 3. Social Aspect in LCSA Taman Nasional Teluk Cenderawasih
Source: Secondary Data Processing (2023)

TNTC has met all stages of evaluation, beginning with local community participation, education, and awareness, which includes community training and human resource capacity building, and cultural awards, as outlined in the 2018-2027 RPJP. However, according to the statistics reported in the 2018-2027 RPJP, there are still a few locals who participate in events or training offered by the

government or non-governmental organizations (NGOs). This can lead to assumptions based on Mukherje, N, and van Wijk's (2003) belief that poor community involvement might be caused by the community not being included in decision-making. The last aspect, which is the environmental aspect that is shown in the Table. 4.

	Local Economic Impacts	Status	Detail	Reference
Economy	Jobs for local residents	✓	Patrol, MMP, Etc	RPJP 2018 - 2027 TNTC
	Development of tourism infrastructure	×	There is no connectivity infrastructure yet	RPJP 2018 - 2027 TNTC
	Increase in local economic income	✓	2-fold increase in 2022	RPJP 2018 - 2027 TNTC
	Kebetlanjutan Keuangan	**Value**		**Reference**
	Operating costs	155 Billions / Year		RPJP 2018 - 2027 TNTC
	Income	102 Billions in 2022		[illegible]

Tab. 4. Economy Aspect in LCSA Taman Nasional Teluk Cenderawasih
Source: Secondary Data Processing (2023)

The RPJP 2018-2027 controls whale shark ecotourism while also monitoring their numbers and the maritime environment for conservation purposes. SST, salinity, and pollution are all considered water quality variables. SST in the TNTC varies from 27 to 32 degrees Celsius, which might have an impact on migration patterns and whale shark populations. The salinity in TNTC is normal (33-34%). Water pollution from ship and speed boat emissions is not clearly regulated, however sulfur content in gasoline is. Transitioning to biodiesel and other environmentally friendly fuels is essential for long-term viability. Data on boat fuel use in Cenderawasih Bay is scarce.

c. Green Theory's Explanation in Taman Nasional Teluk Cenderawasih

Green Theory explains the need to respond to inadequate acknowledgment of environmental issues which broaden in sustainability pillars such as social and economic. In International Relations (IR), Green Theory aims to captures the orientation of political relations, values, and agencies in regard with environmental issues. It also stressed on moving beyond environmentalism and political ecology to understand political, economics, and social relations with environmental point of view. Green Theory also gives IR scholarship a moral vision which is the green value or ecocentrism which include rejection of political boundaries between states or agencies with ecosystems (Goodin, 1992). In this paper, we use the combination of LCSA method and Green Theory on TNTC from the data the authors gathered. Green Theory used on this analysis consisted on five aspects including planning phase, implementation and operational stages, external relations, economic impacts, and social impacts regarding TNTC and its transformations. The authors have analysed the data gathered from the national park through the LCSA method and its four phases.

In this analysis, the authors point out the first phase of the planning. From the results, we can see that there are positive progressive impacts from the national park management in increasing the number of whale sharks up to 180. The national park has already developed strategic objectives to uphold its sustainable growth in line with the rules and right methods under Government Issue Number 12 the year of 2014. Not only that, but the national park has also drawn a commitment with the local communities to mitigate and partnerships including NGOs to withstand the growth progress. The authors see these planning actions as the first step to acknowledging the environmental issues in the national park. It captured a glimpse of the ecological viewpoint that there are security issues from within its management and its long-term vision in accordance with the RPJP up until 2027.

The second analysis drawing from the implementation and operational stages saw

growth progress in the national park. The management has drawn a great shift into a greener method of running the national park. Our analysis shows the national park is currently focusing on using greener transportation, controlling the national park protocol, regular monitoring, protection stages, and collaborating with indigenous communities around the national park. From the Green Theory perspective, the national park has shown more cooperative and collective decision-making to raise the boundaries and seek political community for solutions based on political association and ecological relationships (Dyer, 2017). The current RPJP demonstrates the willingness of the national park to transform the past vision into a more cooperative environment, yet encouraging application in the green economy. The authors also see the plan to collaborate with the indigenous communities or NGOs to represent the national parks to give social benefits to its surrounding. It also represents the moral vision in the form of green value which operates in human material development to support the national park's sustainable growth in the future.

We also gathered some data regarding the national park's partnership with local government, think-thank, and NGOs as our third analysis stage. Drawing from the current RPJP, we can recognize the ecocentrism which arises around the operational and maintenance control of the national park. The decentralization governed by the local government also gives some advantages to benefitting the local resources circling around the national park. In line with the Green Theory, the authors point out that national park management has transcended the political boundaries to acknowledge localization to promote cross-community cooperation. If the current partnerships can be retained in perpetuity, sustainable growth can be increased annually. We also observed the desired outcomes from the partnerships will be a green social movement collaborating across local and national actors. We can accept the fact that the national park has embraced ecocentrism which coincides with the Green Theory's perspective on dealing with environmental issues.

The results of the LCSA examination reveal that Taman Nasional Teluk Cenderawasih (TNTC) has successfully met the evaluation criteria outlined in the RPJP 2018 – 2027, particularly with respect to the local economic impact. Specifically, as the fourth analysis, TNTC has demonstrated efficacy in providing employment opportunities for local inhabitants. The park's adherence to the established criteria underscores its positive influence on the local economy, contributing to job creation and economic growth within the community. Nevertheless, the assessment of tourism infrastructure development reveals a deficiency in infrastructure within the TNTC vicinity, necessitating the establishment of suitable accommodation options to cater to the needs of TNTC tourists. The development of ecotourism is contingent upon sufficient infrastructure within national parks. The presence of a good infrastructure is instrumental in enhancing accessibility to the national park, which can lead to an increase in the number of visitors. Accessibility is a central element of any responsible and sustainable development policy. It is both a human rights imperative, as well as an exceptional business opportunity (United Nations, 2017). Furthermore, it facilitates improved mobility within the park premises. Implementing this measure is expected to facilitate the navigation of visitors through various sections of the national park and enable them to reach spots where they can observe whale sharks.

In addition, it will facilitate the delivery of enhanced services for guests. Besides that, the

presence of a good infrastructure can create economic prospects for the neighboring communities of national parks. It is a vital ingredient to economic growth and development, which is the key to raising living standards (Henckel & McKibbin, 2010). Other than that, national park visitors' safety and security are contingent upon sufficient infrastructure, encompassing reliable evacuation routes and prompt access to emergency services. Therefore, national parks must invest in good infrastructure to ensure accessibility, service quality, environmental sustainability, local economic growth, and the safety and security of tourists. It is noteworthy that the design of the infrastructure must prioritize environmental sustainability to protect and preserve the national park's ecosystem. The Green Theory perspective emphasizes the significance of achieving equilibrium between the pursuit of economic expansion and safeguarding the environment in Cenderawasih Bay National Park. The main objectives of sustainable design are to reduce, or completely avoid, depletion of critical resources, prevent environmental degradation caused by facilities and infrastructure throughout their life cycle, and create built environments that are liveable, comfortable, safe, and productive (WBDG Sustainable Committee, 2021). Establishing infrastructure necessitates adopting sustainable measures, responsible management of scarce natural resources, economic sustainability in the construction of infrastructure and lodging in Cenderawasih Bay National Park, and sustainable economic diversification with a view to decreasing reliance on industries that have a detrimental impact on the environment. Furthermore, it can be observed that there has been a significant rise in the volume of visitors during the period spanning 2021 to 2022, exceeding twice the previous count. This suggests that there is a potential for a corresponding surge in the local economic revenue within the vicinity of the Cenderawasih Bay National Park region. According to the financial sustainability assessment outlined in the 2018 – 2027 RPJP, the aggregate operational expenses incurred by Cenderawasih Bay National Park amount to 155 billion annually, surpassing the company's maximum revenue of 102 billion per year, which was recorded in 2022. Consequently, it is imperative to implement measures that facilitate compliance in the economic domain to bolster the operational expenses of the Cenderawasih Bay National Park. These measures should focus on the development of tourism infrastructure and the fortification of the local economic sector, with the aim of guaranteeing the long-term economic viability of the Cenderawasih Bay National Park. It is imperative to ensure transparency, accountability, and judicious financial management in the allocation and utilization of operational funds.

Lastly, as our fifth analysis from Green Theory perspectives regarding its social dimension, the Cenderawasih Bay National Park has undergone a comprehensive evaluation process, encompassing various aspects such as community engagement, education, and awareness-raising initiatives, including community training and human resource development, as well as cultural accolades that have been codified in the 2018 – 2027 RPJP. It may be inferred that the Cenderawasih Bay National Park has effectively engaged the local communities in the management and advancement of the region. The aforementioned observation demonstrates the dedication and involvement of the local populace towards initiatives aimed at preserving and regulating the exploitation of environmental resources within the region. Furthermore, Cenderawasih Bay National Park has successfully executed impactful educational and awareness initiatives, such as

community instruction and the development of human resources. This demonstrates that the local populace has been equipped with adequate knowledge and competencies to effectively participate in the preservation of the environment and promotion of tourism within the region. Finally, it should be noted that Teluk Cenderawasih National Park has duly acknowledged and expressed appreciation for the cultural values that are inherent to the area. The aforementioned indicates a concerted endeavour to advance cultural diversity and engage indigenous communities in the process of making decisions pertaining to sustainable tourism administration.

IV. Conclusions and Recommendation

The Life Cycle Sustainability Assessment (LCSA) process encompasses key stages such as identification, objectives, potential effects, and implementation strategies. Notably, data from the identification stage indicate a positive trend, with the whale shark population showing an increase following the execution of the Long Term Development Plan (RPJP) in Cenderawasih Bay National Park.

The objectives stage involves the execution of ecotourism activities within the park, with careful consideration of potential impacts by incorporating stakeholder input to prevent undesirable consequences. During implementation, efforts are directed at identifying suitable ecotourism destinations, establishing standards for operators, and promoting environmentally beneficial behaviors. Operational sustainability is emphasized, including initiatives to reduce fuel consumption and plastic waste.

In the maintenance stage, activities such as monitoring, practical adoption, collaboration, sustainability review, and repair and maintenance contribute to ongoing success. The national park has demonstrated commendable strides in sustainable management through collaborations with local communities and non-governmental organizations. Economic benefits and infrastructural development have been addressed, but improvement in connection infrastructure is identified as a priority.

The LCSA findings underscore the importance of achieving a delicate balance between economic growth and environmental sustainability in national parks. This aligns with the principles of Green Theory, emphasizing the significance of adopting sustainable environmental management practices. The LCSA analysis reveals that Cenderawasih Bay National Park's initiatives are consistent with the environmentally conscious principles advocated by Green Theory, emphasizing the need for continued commitment to these practices for future ecotourism management.

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Book Reviews

Human Sustainable Cities Towards the SDGs and Green, Just, Smart and Inclusive Transitions. **By Voula Mega. Cham: Springer Nature Switzerland, 2022, xxx + 303 pp. ISBN-13: 978-3-031-04840-1 (e-Book)**

Sustainability, meaning to strike a balance between the environment, economy, and society, has become a renowned keyword when discussing the future of Earth. Companies, personal lifestyles, and even cities are adapting to be sustainable due to the deterioration of environmental quality, which begins to disrupt the construct of lives and lead to a resource crisis. To provide guidance and planning reference, the UN released Sustainable Development Goals (SDGs) 2030 as the most comprehensive transformational sustainability agenda to help the nations working towards sustainability. With the existence of SDGs, many cities are adapting them into their development agendas and working to implement them. Nevertheless, the progress made does not seem to be promising since there is hardly a single country on track to achieve the SDGs by 2030. Despite the predicaments, cities remain relentlessly transitioning to actualize advancement in the cities' quality.

In this book, Mega, who is a professional in the European Commission, reveals the sustainability transition endeavours through beautiful watercolour illustrations of several major cities worldwide: Rio de Janeiro, Berlin, Tokyo, Stockholm, Amsterdam, Dubai, Toronto, Melbourne, Valencia, Boston, Singapore, Washington, D.C., and Athens. This book was written to commemorate the valuable lessons obtained by cities during the COVID-19 pandemic and as a preparation for the Glasgow COP-26. Mega begins the book in the first chapter by asking about the prospects and drivers of change for cities in this uncertain, complex, and full-of-crisis era.

Travelling back to 2020 during the COVID-19 pandemic health crisis, which extended to the socio-economic crisis, she argues that the pandemic has unfolded the flaws of the unlimited growth model. Despite the restrictions made during the pandemic, which contributed to better environmental quality, the good progress did not sustain when the pandemic restrictions were gradually lifted. She highlighted that the pandemic has called for the urgent necessity to strengthen each sustainability pillar and awakened the cities to continue the transformation to be sustainable.

Going to the second chapter, Mega also reveals the imminent issues faced by almost all cities worldwide: natural resources and biodiversity decline. Due to the enormous need for resources to support living and production activities in the cities, the natural resources—water, soil, and clean air—faced severe deterioration and hardly regenerated themselves shortly, even with the assistance of technology. Nevertheless, these issues should not be a hindrance for cities to keep progressing because, as Mega implied on page 12, this is a "race against time". Climate change is aggravating and continues to show its undesirable impacts on cities' lives.

In the rest of her book, Mega provides a glimpse of hope through multiple climate-conscious actions that cities can adopt. For instance, clean energy provision to decrease carbon emissions and ways to decarbonize cities; and reconstructing cities to be "car-free" to promote more walkable cities. Besides technical approaches, Mega also uses social and economic approaches, as sustainability entails the balance between these pillars. One of the interesting points is the promotion of

warm-welcoming cities amidst the growing migration issue. She pointed this out reasonably: warm-welcoming cities can ease community integration, increase social cohesion, avoid class segregation, and enable inclusive-collaborative cities, which will advantage the city's development.

The cases that Mega provides throughout the book also show that sustainable cities are not only a dream for cities in developed countries. Cities in developing countries can always adapt and adjust their sustainability agenda to their local values to increase the participation of citizens in accomplishing sustainability goals. Mega's exemplifications in "Human Sustainable Cities" are concisely pointed out and enriched by her expertise and work experience, making this book a salient guideline for the city's government, urban planners, and academics in promoting sustainable transformation in the cities.

Lastly, "Human Sustainable Cities" is an enjoyable read, not only for urban topics passionate but also for everyone who wants to understand better about cities, the places where 56% of the world's population live. Furthermore, this book also relates to anyone who studies international relations, particularly those who are focusing on the sustainability agendas of the UN. Things that add unique value to this book are that she exemplifies and aligns the majority of the sustainable actions with the UN guidelines, not only the SDGs but also the previous climate accords made by the UN.

Although many terms may sound new to readers who are not familiar with urban topics, Mega's writing is relatively easy to understand, as she always defines and explains nicely to reduce the complexity and increase the accessibility of this book. Voula Mega invites the readers to delve deeper and feel their meaningful existence in the cities, as citizens are obviously an integral part of the development, and their participation is essential to the success of sustainability transformation. With the broad cases provided and the depth of the analysis, Mega's writing has contributed significantly to urban discourse and its integration with sustainable development, enriching the literature in this field.

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Book Reviews

Globalization and Islamism: Beyond Fundamentalism. **By Nevzat Soguk. Plymouth: Rowman & Littlefield Publishers, Inc, 2011, vii + 247 pp. ISBN 978-0-7425-5752-9**

The relations of Islam as a religion and as a thought that intertwined with the notion of globalism have emerged boldly, especially after the 911 tragedy in 2001. However, the aforementioned tragedy was not the beginning of the discussion on Islamism and Globalization. Soguk in his writings on this book provides an interesting point of view in portraying globalization as the zone of indistinction (p.190). Hence, in his view, Islam and the ongoing globalization have not only filled with 'a civilizational clash' but also the zone for opportunities for the so-called 'tranversalist' movement to get along with the wave of globalization (p.192).

The different path of the moderate approach of Islam that willing to think of Islam under the global condition. These societies placed Islam as a foundational filter in which globalization is seen as a reality that can be negotiated, accommodated, or appropriated (p.6). Soguk's historical discussion provides us with a clear genealogy of ideas that demonstrates the heritage of tolerance and free thinking rooted in the cosmopolitan and globalized quality of Islamic society.

In this book, Soguk nicely reveals the Islamic Cosmopolitan that Islamic societies have owned. The value that has been undermined by the 911 tragedy, and many other terrorism issues – which then become identical with Islamic extremist groups - . By taking the study cases in Indonesia and Turkiye, Soguk portrays the discourse of moderate Islam. His study has shown the conversation among the Islamic groups for centuries.

For Indonesian society, He underlines that Islamic values have never been viewed as alternatives or replacements. It has rather been seen as an advancement and growth (p.150).

Hence, instead of rejecting modernity, Indonesian Muslim society turns it into something valuable to attain its interest. One of the particular examples that Soguk mentions was the Indonesian independence spirit during the anti-colonial movement.

By tracing the historical background of Islam in a certain location, Soguk acknowledges the influence of local wisdom resulting from the earlier civilizations in accommodating the newer values coming to its society. Hence in his view on Indonesian society, he argues that the existence of earlier local wisdom of Hinduism as well as Buddhism has contributed to the indigenization process of Islam in the Indonesian archipelago (p.151). In addition, there were the roles of local figures named; Sunan Gunungjati (Syarif Hidayatullah), Sunan Kudus (Ja'far Shadiq), Sunan Muria (Raden Umar Said), Sunan Gresik (Maulana Malik Ibrahim), Sunan Bonang (Makhdum Ibrahim), Sunan Ampel (Raden Rahmat), Sunan Drajat, Sunan Kalijaga, Sunan Giri – who transmit Islam into the local society especially in Java area. Those local figures – usually called Wali Songo – have been a symbolic representation of the accommodative value of Islam through the process of acculturation through soft power and ideational flexibility (p.152).

In his further explanation, Soguk even underlined that the aforesaid Islamic convergence had been one of the founding legacies of modern Indonesian identity. Referring to Abdurrahman Wahid's view of Islam and Indonesian society, Soguk highlights that Islam and rationalization have been a

manner in its Muslim society (p.154). Therefore, it is not strange that Indonesian Muslims are open to using *ijtihad* (independent thinking) as it is also seen as their capacity to adjust to particular thinking as well as to preserve Islamic universal ideals.

Futhermore, Soguk mentioned about the way *Pesantren* (Islamic boarding school) has functioned as both moderating and socializing medium in circulating the religious knowledge with Indonesian brand (p.164). At the same time it also cultivated Indonesian muslims with capacity to respond to worldwide developments – from colonization to globalization - .

In addition, there are two major Islamic organizations – Nahdlatul Ulama (NU) and Muhammadiyah- that dominate in contextualizing the Islam into Indonesian society. He highlights that both organizations have successfully interplay the secular as well as the sacred position in regulating public spaces (p.6).

Overall, this book delivers clear information with condensed historical explanation. Although, to some extent, His review on both Turkish and Indonesian cases are simplified. For instance, his argument on Indonesian's syncretic manner of Islam which are different with the Arab Islamic countries (p.6) can actually be viewed as neglecting the fact that there are also some conservative groups that disagree with it. Nevertheless, those general discussion on history could help us to open the further discussion on Islam and its contextualization process within globalization discourse.

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