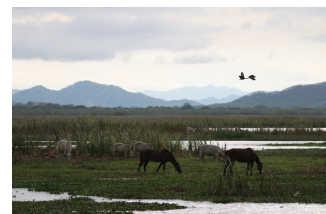
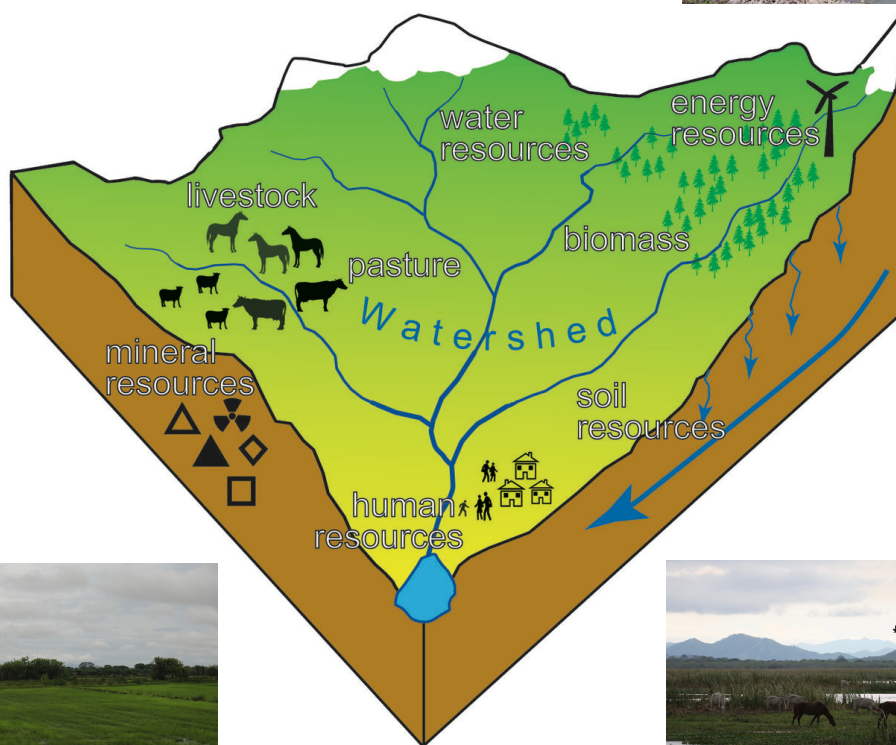


Wise Up! : Incorporating the Ramsar Convention’s “Wise Use” approach in the buffer of Palo Verde National Park and in the greater Tempisque watershed

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Executive Summary

Costa Rica has a robust framework and history of environmental protection, especially through establishing protected areas. Environmental law, however, can be limiting when dealing with socio-ecological systems that display uncertain and complex behavior. Environmental values and management objectives for the same-name, composite National Park and Ramsar Site of Palo Verde have mainly been conservation focused and do not fully embrace an ecosystem approach accounting for other human activities in the area or the watershed as a whole. It is in this context that we propose options for applying wise use as in the Ramsar Convention: i) to currently non-protected areas in close proximity of the wetland that provide analogue ecosystem services in terms of waterbird habitat or nutrient capture such as the rice paddies; ii) to the wider watershed including through hydrological and protected area connectivity as well as negotiated environmental flows; iii) in the context of adaptive management and resilience building of the whole socio-ecological system, starting from the current institutional frameworks and processes.

Areas in close proximity to Palo Verde, or the buffer region, hold significant rice farming activity. Rice paddies create artificial wetland habitats that have downstream impacts on water flows and nutrient levels, which could be leveraged to create environmentally beneficial effects on the health of Palo Verde and the surrounding ecosystem. An incentive mechanism, such as payments for ecosystem services, could be used to help rice farmers in the region adapt farming techniques and technology that could serve as a crucial tool in sustaining and improving the health of the region's ecosystem. Extension of the Palo Verde Ramsar site border to include these rice farms could help effectuate such changes by applying legal authority and obligation to utilize the rice farms in a wise use adaptive management approach to the region.

Costa Rica has been an environmental pioneer, but the overlap of authority and legislation have created a situation in which government agencies face difficulties when managing wetlands and creating a network of hydrologically connected areas. Though it has recently adopted a National Wetlands Policy meant to better coordinate agency planning, this still does not include a provision that allocated water to the environment as a recognized user. Including such a provision would assist with the adoption of watershed-level management and long-term planning by recognizing the needs of the environment as an actor on par with other stakeholders. Additionally, short of repealing the 1942 Water Law, incorporating such a provision would allow the governing agencies of protected areas to better coordinate their needs beyond the jurisdictional restrictions imposed by geographic, rather than ecological or hydrological, limitations.

Two major policy novelties are discussed that bear the potential to further accelerate this transition to practical implementation of wise use through adaptive management of wetlands, namely the Nexus approach and the 2017-2030 National Wetlands Policy of Cost Rica. Ultimately, wise use and adaptive management need to be incorporated and reflected in the site management plan as part of the requirements by the Ramsar Convention. To that effect, the conclusions to this paper have been formulated with a view to linking them to priority areas for an updated integrated management plan for Palo Verde, and complement ongoing policy processes under the best and a less ideal legal reform scenario alike.

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1. Introduction

The “Convention on Wetlands of International Importance, especially as waterfowl habitat” is an international treaty that provides framework and international cooperation for the conservation and wise use of wetlands. This treaty is more popularly known as the “Ramsar Convention” as the original treaty was signed in Ramsar, Iran in 1971.¹ The Ramsar Convention was a turning point in international environmental law as it was the first of the modern global multilateral environmental agreements and it was innovative in the explicit recognition of the relationship between sustainable use of natural resources and conservation.² It was also forward thinking the critical role of wetlands in the global hydrological cycle.³ The scope of the convention is broad, and the definition of wetland employed can include a wide array of ecosystems involving water in order to make the treaty as inclusive as possible. This can include all wetlands, rivers, and coastal zones, whether natural or artificial. As of 10th July 2018, the treaty has 170 members and 2,315 “Ramsar Sites” are designated under it.⁴

Parties to the treaty agree to maintain the ecological character of the wetlands that they designate as Ramsar sites, which obligates the party to “formulate and implement their planning . . . as to promote the conservation of the wetlands . . . and as far as possible the wise use of wetlands in their territory.”⁵ This concept of wise use was unique at the time in that it emphasized that human use of wetlands can be compatible with conservation. The definition of wise use has evolved since the original signing. In 2005, the wise use of wetlands was redefined as “the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.”⁶ Wise use, as explicitly mentioned in this current definition, is an example of an ecosystem approach which promote conservation and sustainable use in an equitable way, and are similarly adopted by other environmental treaties such as the Convention on Biological Diversity (CBD).⁷

Costa Rica is world famous for its forests but it also contains more than 350 wetlands covering close to 7% of the national territory. Of these, approximately 30% are formally protected and 12 have been declared internationally important by the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (i.e., Ramsar Sites) based on their importance for conserving biodiversity (e.g., for water birds and fish species), and/or for the representative, rare or unique wetland types contained therein.⁸ The preexisting Palo Verde National Park was designated Ramsar Site #540 in 1994 and today comprises eight more areas with different protection status: Lomas Barbudal Biological Reserve, Mata Redonda and Cipanci National Wildlife Refuges, the Corral de Piedra, Laguna Madrigal y Riberino Zapandí Wetlands, and the non-protected Sonzapote and Tendal wetlands for a total of 29,041 hectares (of which Palo Verde National Park covers 19,800 ha; see Figure 1 below).^{9 10}

When Costa Rica ratified the Ramsar Convention in 1991, it made a promise to protect wetlands, promote their sustainable use and management.¹¹ It created government agencies tasked with wetlands management, enumerated their responsibilities, and gave them the force of law when the Organic Law of the Environment (LOA) was passed.¹² The LOA declared wetlands as management category under the administration of the SINAC (National System of Protected Areas) and the Ministry of Environment and Energy (MINAE).¹³ MINAE has exclusive

authority over Biological Reserves, National Parks, and State Wildlife Refuges, and SINAC-MINAE has a mandate “to protect, supervise, and administer, with an ecosystems approach, the wetlands...”¹⁴ under the Wildlife Conservation Law. The Wildlife Conservation Law extends into privately owned property through the Biodiversity Law, which “establishes the environmental function of real property... real estate must comply with an environmental function.”¹⁵

With this robust framework and history of environmental protection, it is surprising that Costa Rica has only recently introduced a National Wetlands Policy that recognizes the need for integrated watershed management and foreshadows the potential for designating the environment as a user of water. Legal framework is not enough, though. Laws can even be limiting when dealing with socio-ecological systems that display uncertain and complex behavior.¹⁶ Wetland governance that integrates wise use obligations and an integrated watershed management approach could help support future sustainable Costa Rican water governance.

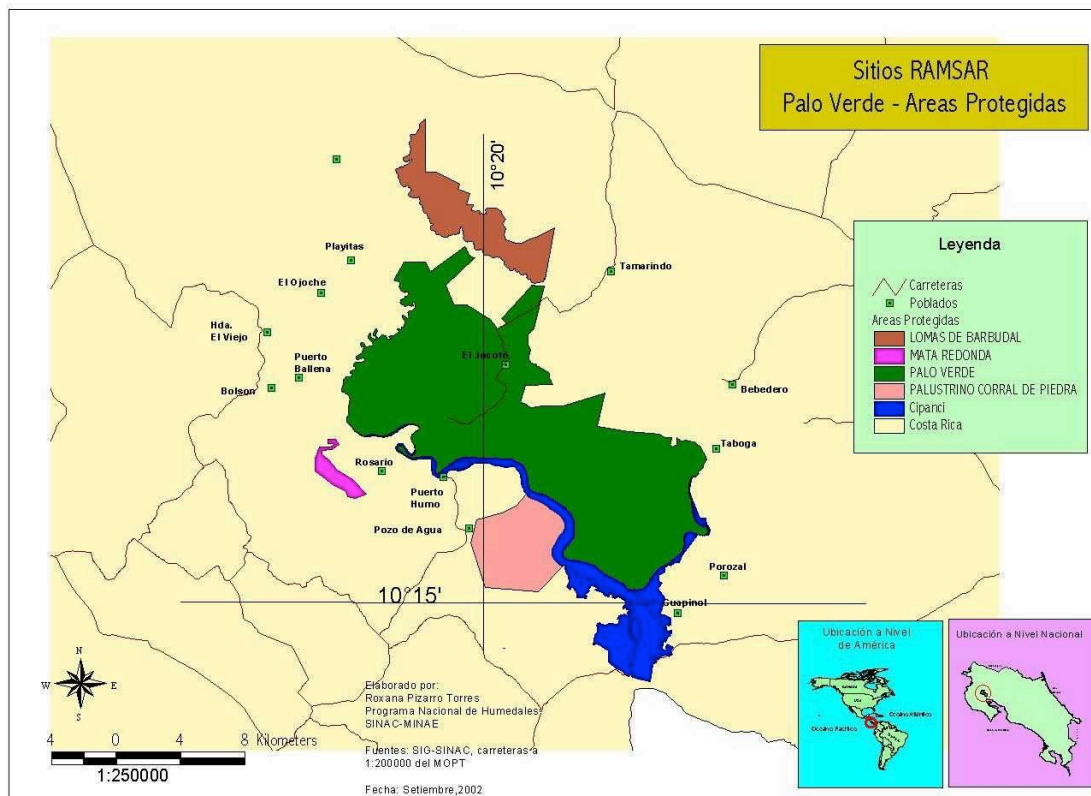


Figure 1: Protected Areas in ‘Palo Verde’ Ramsar Site¹⁷

The Palo Verde Ramsar Site is also part of the greater Tempisque watershed. The economy of this region has long been based on extensive cattle ranching, and many of the formerly forested upland areas have been converted into cattle pasture.¹⁸ Traditionally, the wetland areas of the lower basin were used for grazing during the dry season since they remained green much longer into the dry months than upland pastures. The crash of the beef market in the 1980s, the rise of tourism, and the implementation of a region-wide hydroelectric/irrigation project have contributed to the transformation of land use in the Tempisque watershed from an extensive cattle-ranching system to a more diverse and more intensive agricultural system.¹⁹ Along this trajectory, and in the face of climate change, one of potentially a series of projects

to build additional water storage for irrigation but also human consumption in the basin is at its advanced stage of proposal.^{20 21 22}

These societal choices understandably associated with the welfare of the farming communities seem at odds with the continued existence of Palo Verde, whether as the same ecological character as when designated a Ramsar Site, or allowing for increasingly multiple and potentially conflicting objectives, most apparently wildlife, flood and fire management. This is despite Costa Rica's history of effectively establishing and managing Protected Areas against land use change. Environmental values and management objectives, especially for the National Park, have mainly been conservation focused and do not fully embrace an ecosystem approach accounting for other human activities in the area or the watershed as a whole.²³ It is in this context that we propose options for applying wise use i) to currently non-protected areas in close proximity of the wetland that provide analogue ecosystem services in terms of waterbird habitat or nutrient capture such as the rice paddies; ii) to the wider watershed including through hydrological and protected area connectivity as well as negotiated environmental flows; iii) in the context of adaptive management and resilience building of the whole socio-ecological system, starting from the current institutional frameworks and processes.

2. Wise Use in the Buffer of Palo Verde National Park *(by Jacob Kupp)*

I. The Buffer's Environmental and Economic Importance

Areas in close proximity, or the buffer area, of Palo Verde National Park hold significant environmental importance and could be used as an integral part in an overall wise use and adaptive management approach to the region.²⁴ Areas in close proximity hold fertile farming land and are thus used for various agricultural activities.²⁵ Due to the proximity of the farms, and the water flows through the area, farming practices in these nearby areas have significant impacts on Palo Verde and the watershed as a whole.²⁶ In particular, rice farms in the bordering region should be considered as they could serve as a tool in management strategies.

Rice is an important crop as it holds sociological, economic, and ecological significance to the region and the country of Costa Rica as a whole. On a sociological scale, rice is a major food staple of the Costa Rican diet and is eaten with a large percentage of daily meals across the country, and thus it holds significance in the cultural identity of the nation.²⁷ On an economic scale, its prevalence in the national diet has significant implications in the national economy and it holds significance in concerns related to food sovereignty and food security.²⁸ Costa Rica's consumption of rice is the second highest in the Americas, and rice represents 8% of the total value of the Costa Rican food basket.²⁹ On an ecological scale, rice paddies create artificial wetlands that increase biodiversity by providing habitat to many important animal species, including waterfowl.³⁰ Well-managed rice farming also can increase groundwater recharge and help to control flooding and erosion.³¹ Further, rice paddies can act as a biological buffer to minimize impacts of intensive agricultural production in the region and could serve to absorb nutrients from runoff of other production, stopping it from being deposited directed into the wetland or river.³²

A significant percentage of Costa Rica's rice farming takes place in the Tempisque basin due to the optimal soil and irrigation system of the region.³³ In fact, it accounts

for 45% of the total national rice production.³⁴ Specifically, rice production takes place in the area closest to Palo Verde. In Costa Rica, the main species of rice cultivated is *oryza sativa communis*, which is made up of multiple popular varieties.³⁵ Rice farming consists of flooding the field from planting until the rice is ready to harvest, and the depths of water used during farming have important effects on weed and pest management.³⁶ There are two growing cycles in a year in the Tempisque Basin, as directed by the Arenal-Tempisque River Irrigation District (PRAT), which is managed by the National Service for Irrigation and Drainage (SENARA).³⁷ SENARA also sets irrigation tariffs and allotments for farmers in the region.³⁸

Palo Verde is a wetland of critical importance, as indicted both by its designation under Costa Rican law as a National Park and under international law as a Ramsar Site.³⁹ However, the wetland has faced concerning ecological changes in recent years, leading the wetland to be included on the Montreux Record under the Ramsar Convention in 1993, which signifies its threatened nature.⁴⁰ Invasion of *typha domingensis* (Cattail) is one form of evidence of the problems in the watershed related to altered hydrology and nutrient loading.⁴¹ Strategic management of rice farming practices in the border regions of Palo Verde could be leveraged in an overall approach to improving the ecological system and water flows of the region. However, driving change to more environmentally friendly farming practices in the border region will likely face issues.

II. The Costa Rican Rice Market and Palo Verde

The rice market in Costa Rica is thoroughly regulated; at almost every level in the production chain, the price of rice is controlled.⁴² The National Rice Corporation (CONARROZ) is the Costa Rican public legal entity in charge of protecting and promoting national rice production.⁴³ These policies have been set in place for many reasons. A major concern is ensuring that domestic rice production remains a part of Costa Rica's cultural identity, given rice's importance in a wealth of daily dishes and meals. Maintaining domestic control over rice production has also been advanced in relation to food security.⁴⁴ However, these market controls cause several issues.

While these control policies are in place to protect and promote the rice industry, rice production in Costa Rica has faced trouble.⁴⁵ Rice productivity in Costa Rica is one of the lowest in Latin America.⁴⁶ Additionally concerning is that the number of rice producers and the varieties of rice species farmed have declined under the system, leading to a smaller number of larger industrial rice producers and millers that have major control over the rice market.⁴⁷ The CONARROZ model has thus faced much criticism, especially in relation to its importation of paddy rice.⁴⁸ CONARROZ has the authority to import rice tariff free to meet demand when domestic rice production falls short, while other economic agents are still subject to the tariffs.⁴⁹ Once CONARROZ buys this tariff free rice, it distributes it to the millers in proportion to their participation in purchasing domestic production.⁵⁰ The rents from this transaction system are taken by CONARROZ and are transferred to the growers, through a hedge fund, in proportion to their levels of production.⁵¹ However, the millers capture part of this rent due to the vertically integrated nature of the industry.⁵² Thus, millers benefit from the lower international prices, captured by these rents, and prefer to import rice as opposed to the risky process of rice cultivation.⁵³ Further, the transfers to growers are strikingly disproportionate; a very small percent of larger

farmers receive a majority of the import rent while a large majority of smaller farmers receive a fraction, and thus have a hard time remaining profitable.⁵⁴

Areas in close proximity to Palo Verde hold a significant amount of small farmers.⁵⁵ Under this regulatory system, small farmers are increasingly being forced out, which could have negative effects in the region. One major concern is that smaller farmers are being pressured into selling or leasing their land to industrial producers who can better maintain more profitable margins.⁵⁶ Industrial products generally have more environmentally degrading farming practices than smaller rice farmers, and thus this could increase negative environmental impacts in the region. Industrial farming practices require large scale, continuous exploitation of land which often overuses chemical fertilizers and contributes to downstream water pollution.⁵⁷

Another major concern is that smaller farmers will change their practices to remain profitable. Small farmers may shift from rice farming to other, more lucrative crops not subject to the rice market control scheme, such as sugarcane or pineapple, which do not provide the same wetland habitat and biodiversity benefits of rice paddies. Shifts from rice to other agricultural products in the region may amplify negative environmental impacts and pose a concern for the ecosystem.⁵⁸

Further, market controls in place may promote inefficient use of agricultural inputs that are damaging to the environment. The current irrigation policy set in place by PRAT and SENARA sets high irrigation tariffs in the Arenal-Tempisque region which are highly subsidized by government transfers.⁵⁹ Irrigation subsidies can distort the economically optimal use of water, and encourage overconsumption due to lower effective prices.⁶⁰ Underpricing of irrigated water can thus lead to an inefficient use of water and encourage more intensive farming practices that require increased chemical fertilizer and water use.⁶¹

III. The Rice Market, the WTO, and CAFTA

Further complicating the rice market is Costa Rica's obligations to the World Trade Organization and under the Central American Free Trade Agreement (CAFTA). As a member of the WTO, and a party to the Agreement on Agriculture (AoA) under the WTO, Costa Rica is bound to reduce trade distorting subsidies over a set period of time.⁶² Trade distorting subsidies are measured by the Aggregate Measure of Support (AMS) indicator, and Costa Rica has a set limit of AMS levels per year.⁶³ However, Costa Rica began to face accusations in 2010 that it was breaching its set limits⁶⁴, and in 2015, concerns were still being raised that the price controls in place in the rice market would continue to violate Costa Rica's WTO commitments.⁶⁵

In addition to WTO obligations, key provisions of CAFTA require Costa Rica to reduce and eliminate certain tariffs over set periods of time, expand tariff-rate quotas, and eliminate export subsidies on agricultural products.⁶⁶ Costa Rica was the last country to ratify CAFTA on January 1, 2009 as it held concerns in ratifying the treaty.⁶⁷ A major concern Costa Rica had was a loss of food security; under CAFTA farmers have to compete with giant economies like the United States. The United States spends over a billion USD annually on rice subsidies alone, which enables it to flood international markets with cheaper rates that other countries cannot compete with.⁶⁸ As seen in Mexico, ratification of international free trade agreements can lead to elimination of small farmers.⁶⁹ As CAFTA requires eventual elimination of tariffs

on rice imports, small farmers will struggle to compete with cheaper imported rice from the United States.

CONARROZ has been concerned with protecting domestic rice production and argues that adherence to the WTO and CAFTA in the domestic rice market will result in the demise of Costa Rican rice production. However, Costa Rica's price fixing policies in place have already run afoul to WTO commitments, and may additionally frustrate its ability to eventually eliminate tariffs under CAFTA. Thus, new approaches considered will have the difficult task of both enabling smaller farmers to remain competitive while also complying with commitments under international law.

IV. A New Approach: Payments for Ecosystem Services

In order to address these economic, environmental, and international concerns, new approaches are needed. Inspiration can be drawn from successful programs that have worked to achieve similar goals. An applicable example is the European Union's Natura 2000 program. Under Natura 2000, a European network of areas was developed where human activity is seen as compatible with conservation of sites of natural importance.⁷⁰ Similar to wise use under Ramsar, Natura 2000 recognizes that human activity can be leveraged to maintain the site's ecological importance.⁷¹

For many Natura 2000 sites, the management is done through agriculture. In order to incentivize farmers to adapt farming practices that maintain or improve the nature value of habitats and species, Natura 2000 utilizes agri-environmental measures.⁷² This includes various types of subsidies to pay farmers for the ecosystem services they provide by adapting more environmentally friendly practices.⁷³ Natura 2000 also has worked to compliment the environmental subsidies with market-based instruments, such allowing farmers to label their products as coming from Natura 2000 sites, making their products more attractive to consumers.⁷⁴ The sale of these organic farm products in turn can help to promote local eco-tourism in the rural areas that they originate from.⁷⁵ The co-existence of farming and the protection of Natura 2000 sites have resulted in several benefits for both farmers and nature. Farming practices were improved to suit the land, farmers are a continuous presence on the land that is less costly and more effective than management by an external body, and farmers are able to diversify their agricultural sources of income.⁷⁶

Utilization of similar support methods to farmers and elimination of the current rice market price controls in place may be able to promote rural livelihood, agricultural productivity, and environmental benefits while also remaining compliant with international obligations.⁷⁷ This could be done through a specific form of conditional cash transfer: Payments for Ecosystem Services (PES).⁷⁸ Costa Rica is no stranger to the concept; Costa Rica pioneered PES in 1997 to fight deforestation.⁷⁹ PES recognizes the value of services ecosystems provide to society and pay landowners for preserving them. In the buffer region, environmentally beneficial farming practices could be effectuated through a PES system by rewarding farmers for implementing farming practices that will benefit the ecosystem of the region.

If constructed correctly, a PES system for rice in the region could help to advance the security of domestic rice production, help small farmers remain competitive with increased funding and profitability, and benefit the region through cleaner water, increased biodiversity, and increased habitat for migrating waterfowl and native fauna

through the rice paddies' function as artificial wetlands. The additional income from PES could both help small farmers stay in business and encourage them to continue rice farming instead of switching to other crops. Further, a PES system can be constructed to comply with WTO and CAFTA obligations, which only restrict trade distorting or export subsidies. Thus, as long as a PES system does not serve to affect trade distortion, it will ensure that Costa Rica remains compliant with international law.⁸⁰ If a PES system could also be designed to achieve similar goals as the current price control scheme, and help replace price controls, this could also bring the market in line with the WTO and mandated AMS levels.

Such changes in the rice market would likely be met with resistance from major industrial rice producers and millers who benefit under the current scheme, and who have strong lobbying power with policy setting authorities. However, change could be facilitated by including the rice farms near Palo Verde in a form of environmental zone classification.

V. Including the Buffer Area Under Ramsar Designation

A new zoning classification for the buffer area could be used to facilitate the implementation of an adaptive management system that leverages human activity in the region to help achieve environmental goals. To drive change in the region, approaches should consider new zoning designations for the areas bordering Palo Verde that include the rice farms. A new zone designation will help give the authority and obligation needed to implement new management techniques. However, most environmental zoning options under Costa Rican law, such as a National Park or Nature Reserve designation, are somewhat inflexible as they restrict human activity, such as farming. Ramsar site designation, in contrast, allows for flexible, wise use approaches that recognize human activity, like farming, as a tool in an adaptive management scheme. Thus, extension of the Ramsar site boundaries to include the buffer area and rice farms, while keeping the National Park boundaries of Palo Verde the same, could serve to help the implementation of a wise use adaptive management system.

While rice paddies are artificially created wetlands, they qualify for protection under Ramsar, and other sites have already taken advantage of this. For example, Kabukuri-numa in Japan is a Ramsar site that includes rice paddies.⁸¹ The rice paddies there are recognized as an agro-wetland buffer zone to an open-water wetland, and can be viewed as an integrated socio-ecological system.⁸² The local town, Tajiri Town, has set up a project with the participation of local rice farmers, academic experts, and non-profit organizations to implement wintertime flooding of the rice paddies to provide optimal dispersal of waterbird populations in the area.⁸³ This strategy has been used to secure other ecological benefits, such as weed reduction and fertility enhancement.⁸⁴ Farmers are given grants to help implement the desired practices, and the rice products from those farms are sold under a premium brand name that secures a better price on the market.⁸⁵

Including the rice paddies near Palo Verde in the Ramsar boundaries could be used to achieve similar benefits. Ramsar site designation brings in expert advice and potential financial support to sites.⁸⁶ This would allow for more international resources and planning in approaches to the area. As Tajiri Town in Japan did, partnering with

academic experts and other environmental authorities is a critical component of successful planning, which could be facilitated through Ramsar's resource network.

Further, extending the Palo Verde Ramsar site borders to include the buffer region and rice farms will serve to recapture lost ecological character of the current Ramsar site. Environmental changes in Palo Verde have led to the loss of waterbird habitat, but the nearby rice paddies has served as a replacement as they currently support significant waterbird populations.⁸⁷ Inclusion of the rice paddies would help to integrate some of, if not all, the lost ecological character of the current Ramsar site in terms of bird populations supported and reclaim protection status of the birds originally in Palo Verde. Another strong incentive to expand the Ramsar site is to adhere to Costa Rica's obligations under the Convention of Biological Diversity. One of Costa Rica's national targets under the convention is to increase the area of wetlands under the Ramsar category to 589,742 ha by 2020.⁸⁸

Including the buffer region in a Ramsar site designation would additionally give Costa Rica the authority and obligation to implement wise use approaches in the area, which could help to expedite the creation and implementation of new management approaches, such as environmentally beneficial rice farming. Costa Rica takes its obligations under international law seriously. Ratified international law, such as Ramsar, is binding over domestic law per Costa Rica's constitution.⁸⁹ Thus, implementation of wise use adaptive management plans to reflect progress with small farmer's adaptation of farming practices and cattail extirpation by the National Park would not have to necessarily conform with conflicting domestic law, allowing for a quicker and more effective ability to implement such plans.

3. Linking Wetlands in Compliance with Ramsar Convention Obligations on Wise Use *(by Jessica Gaudette-Reed)*

The system of water governance in the Tempisque-Bebedero watershed is a mosaic of shared authority and unclear overlap of rules and legislation.⁹⁰ Implementing the Ramsar Convention's wise use guidelines and obligations for linking watersheds has suffered as a result. This section examines the opportunities and obstacles in implementing wise use and linking Ramsar sites in the context of Costa Rica's struggles with cohesive water administration and the promise that the National Wetlands Policy provides.

First, Costa Rica's obligations under the Ramsar Convention are discussed in the context of Palo Verde National Park. Palo Verde is uniquely situated within the catchment system linked to the country's largest hydropower project. It is an agriculturally important area, as approximately 28% of the land is dedicated to farming. It is also home to a Wetland of International Importance that hosts many species of migratory birds. As discussed above, the Tempisque-Bebedero watershed, and Palo Verde National Park more specifically, provides a unique location to examine water governance structures in an ecologically sensitive area with competing water users, including the environment.

Second, the roles of each government agency tasked with wetlands management is examined with a focus on legislative redundancies and administrative overlap. Due to the lack of inter-institutional cooperation and overlap of responsibilities, some wetlands exist in a "gray area" of management where they are neglected and at risk

for ecological harm. The National Wetlands Policy (NWP) introduced in 2017 is an attempt at agency reform and implementation of new legislation that defines the roles and responsibilities of each agency within the context of wetlands to eliminate redundancies. A brief history of water and biodiversity legislation is discussed, followed by a section on the new responsibilities imposed by the NWP.

In conclusion, the opportunities and obstacles Costa Rica faces in implementing wise use and linking wetlands to water, land and biodiversity management through the NWP, Biodiversity Law, and recently proposed water law are compared with Mexico's National Water Reserves Program to determine opportunities for further codification of wise use into environmental legislation and possible obstacles to realization of cogent implementation of the NWP and the Ramsar wise use guidelines.

I. Ramsar Wise Use and Obligations for Linking Watersheds

Costa Rica ratified the Ramsar Convention in 1991 and simultaneously designated Palo Verde National Park located within the Tempisque-Bebedero watershed as a Wetland of International Importance.⁹¹ Palo Verde is one of twelve Ramsar Sites in Costa Rica, and is centered in the greater Tempisque-Bebedero catchment system, so called because of the confluence of the Tempisque and Bebedero rivers merging in Palo Verde. It is also referred to as the Tempisque-Bebedero-Arenal because of the importance of the water diverted from the Caribbean slope by the Arenal Dam, the country's largest hydropower project at Lake Arenal.⁹² Water from Lake Arenal is transferred to the Pacific slope and the Tempisque-Bebedero catchment for hydropower generation and successive irrigation, contributing approximately 17% to the national power grid.⁹³ The watershed is also an agriculturally productive area, with approximately 28% of the catchment area committed to rice, sugar, and melon production.⁹⁴ As a result of the watershed's importance for hydroelectric and agricultural production, sites such as Palo Verde have been impacted by reduced water quantity and water quality. It is in this environment that implementation of the Ramsar Convention's concepts of wise use and linking is most necessary.

Fundamental to the wise use concept is development of national policies on the subject of wetlands. "Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development."⁹⁵ (citations omitted). The wise use approach is centered around people's well-being and encourages community engagement and transparency in decision-making processes.⁹⁶ It embraces the idea that wetland conservation involves sustainable utilization of wetlands alongside the conservation of wetland resources.⁹⁷ Contributing to the challenges Costa Rica has encountered in implementing wise use through legislation is the lack of transparency in water governance. A river basin or watershed management approach, as imagined in the NWP, that links wetlands through the introduction of land use and water planning and management mechanisms could eliminate some of the legislative redundancies frustrating the implementation of wise use.⁹⁸

The Ramsar wise use obligation, as proposed through the NWP, will be converged with the Sustainable Development Goals (SDGs) and other international and national mandates in accordance with Costa Rica's National Development Plan.⁹⁹ This is a consolidation of other legislation that mandates ecological connectivity and the establishment of biological corridors. While this is another example of a new policy

being superimposed over a new, the NWP creates a clear agenda that includes the protection of biologically and hydrologically connected areas in a way that explicitly promotes wise use.¹⁰⁰ The connecting of biologically and hydrologically similar areas creates legitimacy for the recognition of the environment as a user of water.

II. Costa Rica Legal and Administrative Framework

One of the major challenges facing Costa Rica in implementing wise use criteria and integrated watershed management is that water is still governed by a 1942 law.¹⁰¹ Even if the NWP is implemented in full, it will still be managed under an antiquated law that does not have proven ill-suited to adapting to a burgeoning population, commercial exploitation, and climate change.

Water was established as public domain under articles No. 261, 262, 263 and 276 of the Costa Rican Civil Code from 1888.¹⁰² These were incorporated into the 1942 Water Law.¹⁰³ Though it has remained unamended and badly needs updates, legislation that creates governing bodies was later passed to enable enforcement of the law's provisions. The Water Law established MINAE (Ministry of Environment, Energy and Telecommunications) and ICE (Costa Rican Institute of Electricity) the authority for administration and management of water resources and water allocation, and mandates their cooperation with ARESEP (the Public Services Regulatory Authority), AyA (Institute of Aqueducts and Sewers), and SENARA (National Groundwater, Irrigation and Drainage Service).¹⁰⁴

Complicating this framework for water governance in the context of wetlands is the ratification of the Ramsar Convention in 1991. Since becoming party to the Convention, Costa Rica has adopted a definition for wetlands that recognizes their status as an asset protected by the Costa Rican legal system. Initially, Costa Rica adopted a textual copy of the Ramsar definition of wetland.¹⁰⁵ It was later updated in 1995 under the Ley Orgánica del Ambiente (LOA) as:

*“ecosystems with dependent on natural or artificial, permanent or temporary, lentic or lotic, fresh, brackish or saltwater aquatic regimes, including the marine extensions to the outside limits of phanerogamous marine regimes or coral reefs or, in their absence, to six meters of depth at low tide.”*¹⁰⁶

The LOA declared wetlands as management category under the administration of the SINAC (National System of Protected Areas) and MINAE.¹⁰⁷ The two tasked with institutional coordination with the goal of achieving sustainability in the management of natural resources. The National Wetland Commission was also established as an auxiliary organ of MINAE whose purpose was to “establish and recommend management features and policies that permit the conservation of the country's wetlands.”¹⁰⁸ The Commission has been functioning as an advisory group that does not have the authority to make decisions, but the legislature hopes to rectify this through the NWP by creating two coordinating bodies representing the different stakeholders who will be affected by the policy, which is further discussed in the next section.¹⁰⁹

Presently, the ability of SINAC-MINAE to effectively manage wetlands is frustrated by a legal overlap between their authority and that of the Costa Rican Institute of Fisheries and Aquaculture (INCOPECA). INCOPECA has the power to “write,

study, and apply legislation to regulate and avoid the contamination of maritime resources and aquaculture as a result of fishing efforts and other activities that cause contamination.”¹¹⁰ This has resulted in a gray area of administration that has left some wetlands at risk for exploitation. In 1995, the Office of the Attorney General determined that MINAE has exclusive authority over Biological Reserves, National Parks, and State Wildlife Refuges and that INCOPECSA has authority over the remainder of the management categories.¹¹¹ However, because of the composite nature of wetlands such as Palo Verde, this overlap of authority has created confusion as to whether INCOPECSA or SINAC-MINAE has the authority to issue permits in wetland zones.

The bedrock of these institutions is the principle of the State’s Natural Patrimony and the requirement for the Costa Rican government to balance its interest in wetlands on private property as a public resource with the interests of private property owners.¹¹² With this restriction on both protection and use, Environmental Impact Assessments (EIA) must be completed to determine if there significant damage would result from a proposed project.¹¹³ The requirement to undergo an EIA is accompanied by the legal foundation of the Biodiversity Law, which “establishes the environmental function of real property... real estate must comply with an environmental function.”¹¹⁴ This is further supported by the Wildlife Conservation Law that obliges SINAC “to protect, supervise, and administer, with an ecosystems approach, the wetlands...”¹¹⁵ Within this morass, the framework for watershed-level management and recognition of the environment as a user of water clearly existed prior to the introduction of the NWP but has been stifled by poor coordination.

III. National Water Policy and the Designation of the Environment as a User of Water

In 2017, the NWP was announced. The plan’s main objective is the strengthening and conservation of “the genetic, natural and cultural heritage, based on territorial and marine planning based on concerted participation, which ensures respect, exercise and enjoyment of human rights.”¹¹⁶ It offers a framework for long-term planning for the restoration of national wetland systems and the responsible use of them, thereby contributing to the improvement of the quality of life of communities.¹¹⁷ It also proposes guidelines for the convergence of international and national mandates, the formation of advisory committees to guide the process of incorporating wise use into practice, and establishes a plan and designates authorities to inventory all of the wetlands and begin studying their environmental flows.¹¹⁸ Finally, the NWP recognizes the need for integrated watershed management and that “wetlands are both a source of water and users of it, which is why ensuring the water they need will promote the conservation of their biodiversity, as well as the sustainable use of their components,” which is a welcome step forward in terms of integrated watershed management but one which still falls short of Costa Rica’s obligations under the Ramsar treaty because it fails to define the environment as a user of water or propose a timeline for determining environmental flows with the intent of establishing the environment as a user that requires allocation.¹¹⁹

A useful analog for determining potential obstacles to implementation of the NWP and Ramsar obligations is the National Water Reserves Program in Mexico. Unlike the NWP, the National Water Reserves Program explicitly recognizes the environment as a water user requiring allocation.¹²⁰ This allows for the environment’s

natural flows to be determined so that different ecological services and environmental services provided by the ecosystem can be maintained.¹²¹ The strategy has been to identify and protect basins with an availability of water that is close to their natural flow regime and that also have a high conservation value, such as Ramsar sites, in order to implement legal restrictions on water resource development¹²². With such protection, these systems are positioned to adjust and respond to water shortages and regime shifts more nimbly. In the case of Mexico, the National Water Reserves Program has been viewed by the international community as a successful model for adapting to climate change across diverse environments while maintaining obligations under international treaties, specifically the Ramsar Convention.¹²³

Without a relevant law governing the allocation of water to the environment, effective implementation of the National Wetlands Policy in a way that mirrors the success of Mexico's National Water Reserves Program will be hindered. Establishing the base level of water necessary for recharge of the ecosystem, and allocating water to that end, placed the long-term needs of society at the front of planning and avoids the creation of a deficit in the total amount of water available for all users. Under the best circumstances, refraining from allocating water to the environment leads to a race to the bottom approach to water use with users demanding more concessions as populations grow or rainfall is scarce. In the context of a changing climate, allocating water to the environment as a user that receives its allocation before others is a long-term strategy for success and a more holistic approach to development.

Familiar with their role as environmental pioneers, the government of Costa Rica has eagerly adopted Ramsar wise use guidelines into domestic law. However, the introduction of another layer of legislation looks suspiciously similar to past wetland conservation efforts that have ended with middling success. The adoption of the NWP is a bold step forward by the government of Costa Rica, and one that is important in the gradual achievement of connectivity between wetlands. Changes in watershed management is indicative of a culture change in how the government is thinking about water allocation and ecological flows.

Though unsuccessful in 2014, a revision to or repeal of the 1942 Water Law could allow for the connectivity of water governance and the explicit allocation of water to the environment. That is unlikely given prior failures to amend or update the law and its importance as a cornerstone of Costa Rican environmental legislation, but the inclusion of new language supporting institutional coordination, investment in data collection on wetlands, and provisions recognizing the environment as a user of water are on the horizon.¹²⁴ Finally, a system of Payments for Environmental Services that does not require the expropriation of land for use in conservation and linking wetland sites on private property is necessary because of the doctrine of Natural Patrimony of the State underlying rationale behind regulation in the name of conservation.

4. Wise use and adaptive management (by Stefano Barchiesi)

The wise use approach adopted by the Ramsar Convention is an example of an ecosystem approach for the integrated management of land, water and biological resources. Ecosystem approaches have been developed as an integrated alternative to sectoral approaches that traditionally manage for a single ecosystem service and, specifically, for promoting conservation and sustainable use in an equitable way through trade-offs for both human well-being and the environment. This is because

human activities can impact but can also benefit from ecosystems. Integrated watershed management is one such example of an ecosystem approach and a mechanism that encourages a broad, inter-sectoral approach to achieving wise use. This is compatible with the definition adopted in 1995 by the Convention on Biological Diversity (CBD) at its Second Conference of the Parties (COP2) and subsequently affirmed at their fifth and seventh meeting (COP5 and COP7).¹²⁵

As opposed to the more detailed guidance for wise use progressively made available by the Ramsar Convention through a series of handbooks¹²⁶, CBD's ecosystem approach initially comprised a set of guiding principles with suggested annotations to their rationale for implementation. Whereas all relevant, one of these principles in particular is most useful for directing the focus of this analysis and re-conducting it to the circumstances of Palo Verde:

*“Principle 9: Management must recognize that change is inevitable – Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes . . . The ecosystem approach must utilize adaptive management in order to anticipate and cater for such changes and events and should **be cautious in making any decision that may foreclose options**, but, at the same time, **consider mitigating actions to cope with long-term changes such as climate change**”¹²⁷*

Key elements of the above definition are highlighted in bold. Previous sections have explored options for such a non-constraining zonation in the now ecologically involved buffer of Palo Verde National Park and for the additional adaptive capacity that securing even wider hydrological, functional connectivity would confer to the watershed. In this section, two major policy novelties are discussed that bear the potential to further accelerate this transition to practical implementation of adaptive management through wise use of wetlands, namely i) the Nexus approach¹²⁸; and ii) the 2017-2030 National Wetlands Policy.¹²⁹

I. Inter-sectoral Planning and the Nexus Approach in Costa Rica

The need to integrate the ecosystem approach into agriculture, fisheries, forestry and other production systems stems from the fact that all these sectors have an effect on biodiversity as recommended by Decision V/6 taken at CBD's COP5.¹³⁰ Management of natural resources, according to the ecosystem approach, calls for increased inter-sectoral communication and cooperation at a range of levels.¹³¹ This might be promoted through, for example, the formation of inter-ministerial bodies within the Government in Costa Rica or the creation of networks for sharing information and experience among management agencies (i.e., SINAC, SENARA, INCOPECA, IGN, FONAFIFO, CEDARENA, SETENA, etc.)

Water scarcity in the Reventazón watershed has led to an analysis of the supply and demand in the key sectors of Water, Energy and Food, also known as the WEF Nexus, and their interdependencies.¹³² This rapid assessment has shed some light on which priority areas of intervention in public policies could turn tradeoffs among sectors into synergies and optimize multiple water uses. Despite simply being a pilot study by the German development agency GIZ and the UN regional economic commission CEPAL/ECLAS, this example may already have contributed to show the benefits of a joint resource assessment. The same could follow in the Tempisque

watershed where the main difference with the Reventazón is a naturally occurring (climatic) scarcity of water, the still limited urban water needs (the Arenal water transfer was designed for energy generation), and agricultural crops targeting the domestic market (the irrigation scheme was implemented to support local rice production and the associated livelihoods). New knowledge around the Nexus could act as a catalyst of communication and cooperation among sectors that would however require institutional frameworks to operate.

In the absence of an explicit provision for the establishment of watershed management councils^{133 134}, the existing instruments for inter-sectoral planning in Costa Rica reside with the Ministry of Planning and Economic Policy (MIDEPLAN), namely the National and Regional Development Plans as well as the Strategic Plan 2050.¹³⁵ At the more local level, the County Councils for Institutional Coordination (CCCI) report to MIDEPLAN¹³⁶, which is also in charge of coordinating SDG implementation, i.e. the most overarching, cross-cutting agenda in a country.^{137 138} However incoherent with the hydrological unit i.e. the Arenal-Tempisque-Bebedero watershed, this is the institutional mosaic that makes up the water governance regime around Palo Verde. If coordinated across scales, inter-sectoral planning is important to realize one key principle of sound integrated watershed management: reallocation of water to specific uses consistent with the regional water use or land use plans rather than a hierarchy as defined by the 1942 Water Law.

II. Adaptive Management of Ecosystems and Wetlands as a Testing Ground for Costa Rica

Another, yet more consolidated policy change in the country has been development of the National Wetlands Policy of 2017 (as already discussed above) following the establishment by Executive Decree No 36427-MINAET of 2011 of the National Wetlands Program and the National Advisory Council on Wetlands as the implementing body for the Ramsar Convention.¹³⁹ The Policy was developed through international financial support by the 2015-2019 GEF/UNDP/SINAC Project “Conservation, sustainable use of biodiversity, and maintenance of ecosystem services of internationally important protected wetland” or ‘Proyecto Humedales’.¹⁴⁰ This project is driven by, and has contributed to the achievement of, a wide range of national strategies, plans and policies, including the 2006 National Wetlands Strategy, the Executive Decree launching the National Wetland Program and a number of 2011 Policies for Protected Areas (PAs).¹⁴¹

These policies include a number of strategic guidelines of relevance for ‘Proyecto Humedales’ related to gaining knowledge about the state of PAs and the development of a monitoring system, increasing institutional capacity for the management of PAs, development of tools for the participatory management of PAs, use of instruments to value the ecosystem goods and services provided by PAs, and establishment of a solid financial base for the efficient and effective administration of PAs, among others. However, a PA approach may not be entirely or solely suitable. There is a need for flexibility in both policy-making and implementation of adaptive management to ecosystems, which in practice are found in mosaic landscapes. Long-term, inflexible decisions such as designation of new land into a national park or investment in one type of active management of cattail are likely to be inadequate or even destructive. Ecosystem management should be envisaged as a long-term experiment that builds on its results as it progresses.¹⁴² In this context, wetland conservation should be a

mechanism for achieving wise use and not a parallel if not conflicting one; or better, these two mechanisms should be one and the same.

But how to adjust economic activities to ecosystem state or, viceversa, proactively manage the ecosystem for the changing socio-economic landscape and its impacts? One way is through optimization of land use (e.g. degraded wetland within the Park, restored wetland within the Park, artificial wetland outside the Park i.e. the rice paddies) for select ecosystem service improvement. One condition associated with that is for ecosystem management and restoration to build resilience of both the social and ecological system, i.e. diversity as of species as of livelihoods as of built and natural infrastructure.¹⁴³ This is because ecosystem processes and functions are complex and variable, and their level of uncertainty is increased by the interaction with social constructs such as farming cooperatives, the management of which must involve a learning process. This helps to adapt methodologies and practices to the ways in which these systems are being managed and monitored.¹⁴⁴ An adaptive approach to ecosystem management must also involve continuous reassessment of the optimal levels of these select services. The limitations of the approach then relate to the difficulty to achieve and maintain that balance between conservation and sustainable development (i.e. the optimization exercise), and to successfully and regularly convene the relevant stakeholders (i.e. the beneficiaries of the ecosystem services) to make that decision.

Considering the two points above about flexibility and participation in decision-making over water and ecosystem management, it will be apparent how the two Executive Decrees, i.e. the one on active management of Palo Verde (N° 39786-MINAE)¹⁴⁵ and the one establishing CIDECAAT (N° 37187-MINAET)¹⁴⁶, were relatively short-sighted and not a definitive solution. Again, operational guidance from Decision V/6 of CBD's COP5 comes to the aid in the face of the limitations of adaptive ecosystem management. It recommends to focus on functional relationships and processes within the ecosystems and to enhance the sharing of benefits from these functions when yielding services.¹⁴⁷ The institutional frameworks and planning tools identified or set up by the 2017-2030 National Wetlands Policy and associated Program represent an opportunity to consider and incorporate this recommendation in a stepwise fashion that is mindful of scenario pathways or, in other words, adaptable to more than one plausible future. One such example is the strengthening of CIDECAAT beyond its technical capacities to improve scientific knowledge of the system whereas another scenario would involve mobilizing the existing sectoral agencies representing the different water users' interests from the local to the national scale for more negotiated planning based on ecosystem values.

III. Site Management as the Missing Cornerstone: Updating a 2001 Perspective on an Integrated Management Plan for Palo Verde

The cornerstone responses to the degradation and loss of wetlands are knowledge, governance and institutions, investment, and management.¹⁴⁸ Knowledge usually starts with improving current inventories of ecosystem processes and functional relationships between natural assets, services and values from different areas of the wetland. A completed Ramsar Information Sheet meets the basic requirement of the Ramsar Convention at the time of designation for the Ramsar List. However, a more comprehensive 'Ecological Character' description with information on ecosystem components, processes, benefits and services that characterize the wetland at that time

is strongly invited if resources are available (Art. 3 of the Convention).¹⁴⁹ Ongoing research in Palo Verde that builds on a wealth of prior multi-disciplinary studies is contributing to determine the optimal mosaic of ecosystem services in different areas of the Ramsar Site as well as the buffer zone.

In terms of governance, strengthened policy and legislative frameworks for the protection and wise use of wetlands are generally needed. The 2017-2030 National Wetlands Policy has provided a model for the existing, however fragmented institutional structures to implement the associated Program as well as the decision support system for it. The model is to mainstream wetlands in sectoral plans and policies beyond protected area management and through water. Strengthening water governance capacity allows for that flexibility and participation while or in lieu of a Ramsar border extension or a full Water Law reform has been achieved. This stepwise approach is believed to be conducive of adaptive management of the Palo Verde wetland ecosystem because of the learning by doing around shifting water and land uses and management practices that would take place. Investment needs to be both public and private through rewarding and voluntary participation of agriculture with sustainable approaches to production in addressing the wetland challenges.

Management is about the Ramsar site plan and its effectiveness. During the Project Preparation Grant phase of GEF/UNDP/SINAC 'Proyecto Humedales', the Management Effectiveness Tracking Tool (METT) for Protected Areas was used to determine the management effectiveness baseline of the internationally important protected wetlands included in the project.¹⁵⁰ The overall METT score for Palo Verde indicated slightly below medium effectiveness in PA management (47.4%). As a reference to understand this value, 'Proyecto Humedales' also set itself the objective to bring the average METT score up by +20%.¹⁵¹ It is worth pointing out that the National Park section alone scored an average METT of 57.5%, Park which reportedly has a management plan. Costa Rica's National Biodiversity Action Plan recognises the need to develop plans for at least seven of its twelve Ramsar Sites.¹⁵²

The 2001 site management plan for Palo Verde that has been submitted to the Ramsar Convention Secretariat is a comprehensive situation analysis of the challenges and priority areas of intervention for the site at the watershed level. However, it only represents a perspective on actual management actions that are currently missing and would need to be translated into a more specific plan to be formally adopted by Costa Rica's Ramsar Administrative Authority. Not unlike the options for scaling up wise use investigated in this paper, these priority areas identified focus on the need for an inter-sectoral information system for the watershed, informed stakeholder participation, and an integrated management plan for the entire watershed.¹⁵³

5. Conclusions and Recommendations

Costa Rica has made great and rapid strides when it comes to forest conservation and establishing upper-watershed sustainable landscapes such as coffee. Now the country has the opportunity as well as the means in terms of capacity and political tradition of pioneering innovative environmental approaches to shift the attention to wetland conservation and lower-watershed sustainable landscapes such as rice and sugar cane. This paper has investigated options for incorporating wise use of wetlands as per Ramsar Convention definition in the buffer of Palo Verde National Park and in the greater Tempisque and has argued how these represent, when complementing ongoing

policy processes, a more adaptive approach than past piecemeal resolutions. Our conclusions are here formulated with a view to linking them to priority areas for an updated integrated management plan for the Ramsar Site:

- 1) Wise use of rice farming under an adaptive management system in the buffer area of Palo Verde could be leveraged as a valuable tool in achieving environmental objectives for the region. Extension of the Palo Verde Ramsar site to include the buffer area and rice farms could serve to provide the legal authority and obligation to drive change and implement a wise use system. In particular, rice farmers in the region can be incentivized to take part in adaptive management through the use of a PES system, compensating farmers for implementing the farming techniques and technology needed to help achieve objectives for the newly included wise use zone, which could serve to sustain or improve the overall environmental health of Palo Verde.
- 2) Amending the outdated 1942 Water Law to include the innovations in other areas of legislation, such as the National Wetlands Policy, in such a way as to specifically designate agency responsibilities would allow for more comprehensive and streamlined management of wetlands resources in a watershed-level management approach. Alternatively, nullifying the 1942 Water Law through comprehensive agency and legislative reform could also achieve this result but risks undermining the statutory authority of agencies like MINAE and SINAC by nullifying their enabling legislation. Additionally, including a provision that recognizes the environment as a user of water requiring allocation prior to other, as in Mexico's National Water Reserves Program users would allow for agile adaptation and support long-term planning strategies and consider the hydrological and ecological connectivity of watersheds.
- 3) Adaptive management of wetland resources is best achieved by an organic approach to strengthened water governance that is also experimental. This entails a need for building flexibility and participation in decision making around water and land use. Inter-sectoral planning can help with reprioritizing water allocations on a catchment-by-catchment and wise-use basis. If a water law reform falls short in that task, existing institutional mechanisms can be used to mainstream integrated watershed management as highlighted by the National Wetlands Policy. What matters is to act on parallel tracks of responses that are both top-down and bottom-up and not wait for the perfect policy and legislative setup. Zonation maps of the Palo Verde buffer can be drafted and field-tested with stakeholders while water users can convene at different scales of planning to negotiate and trade benefits from the wetland ecosystems, including forms of monetary compensation for their services.

It is therefore recommended that such integrated site management plan includes: a) delineation and characterization of new management zones on the basis of ecosystem service values; b) participation of wetland stakeholders in watershed-level negotiated flow assessments on the basis of these values; c) evaluation of active management activities such as cattail extirpation on the basis of results from the zonation and flow assessments. These are all worthy and interlinked subjects for further research.

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