

University of Florida
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Skills Lab Practicum
Restoration of the Wetlands in Palo Verde National Park: A Legal and
Ecological Analysis
Final Report

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Introduction

Costa Rica's Palo Verde National Park (PVNP) is a place worthy of protection. It is located in Guanacaste province at the terminal point of the Tempisque- Bebedero watershed before the Tempisque river flows into the Gulf of Nicoya, and is an integral element of this river basin. Its borders also contain a wetland ecosystem that provides the habitat for a number of both residential and migratory waterfowl (*Quesada 2006*). Therefore, it is not surprising that when Costa Rica ratified the Ramsar convention on wetlands of international importance in 1991 Palo Verde was included within the Ramsar list.¹

However, significant ecological changes occurring within Palo Verde have destroyed a substantial portion of waterfowl habitat in recent decades, and caused a significant decrease in the number of birds that nest within it. For at least two centuries previous to the designation of Palo Verde as a national park, it had been used for cattle ranching. In the 1920's this cattle ranching intensified, but was stopped suddenly in 1980 when Palo Verde became a national park. This end to cattle ranching coincided with an influx of cattail that destroyed critical habitat for a number of waterfowl that nested in the park, dramatically decreasing the numbers of all waterfowl that utilized the park for nesting, and some previously abundant species actually disappeared from the park completely. Palo Verde was therefore added to the Montreux list within the Ramsar convention in 1993, designating it officially as an impaired ecosystem.

The overarching objective of this policy analysis is to clarify the way in which Palo Verde can be removed from the Montreux list. This is important for two reasons: First, because the list is an indicator of the health of the wetland, and second because having a wetland on the list is a black mark for Costa Rica. Approaching this objective requires a determination of (1) what restoration of Palo Verde will require in a scientific sense, (2) what restoration means within the framework of the RAMSAR convention, (3) how to integrate the domestic law of Costa Rica with the international law of RAMSAR, and (4) how to alleviate conflicts within the various domestic laws of Costa Rica. These goals can then be used to determine when and how the wetland may be removed from the Montreux Record.

Site Description

Palo Verde National Park is situated in the lowlands of the Tempisque-Bebedero watershed in the Guanacaste Province of northwest Costa Rica. The natural vegetation in the watershed is dominated by tropical dry forest governed by a highly seasonal precipitation regime. Flows from the Tempisque River drain into the Palo Verde wetland, and exit through

¹ The specific reasons within the RAMSAR convention that Palo Verde was listed were:

- That it plays a substantial hydrological, biological, or ecological role in the natural functioning of a river basin that it borders
- Is an example of a specific type of wetland, rare or unusual in the biogeographic region where it is
- Is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna
- Is of special value as habitat for plants and animals in a critical period of their life cycles
- It regularly supports a population of 20,000 waterfowl.

Procedure Management Guidance, Report No. 39, Ramsar Site Palo Verde National Park, Costa Rica

the Gulf of Nicoya. Prior to 1977, the Palo Verde wetland was privately owned and managed as an *hacienda*, and the dominant land use in the Tempisque Basin was also pasture, with moderate agricultural production and forested land.

Historical Changes in Palo Verde National Park

The late 1900's was a period of significant local and landscape-level changes in the Tempisque watershed, and in the Palo Verde wetland. In 1980 Palo Verde was converted to a National Park, and cattle grazing, which may have historically contributed to habitat heterogeneity, was eliminated from the wetland. The years following Palo Verde's designation as a national park were marked by extensive drought in the Guanacaste region. In the park, the effects of this ten-year drought were compounded by the construction of a road to Puerto Chamorro, which impeded the flow of *Quebrada Huerton* from entering the Palo Verde wetland. This ephemeral creek was historically important for maintaining higher water levels and extending the duration of the wet season in the wetland². With altered hydrology and little rainfall, severe forest fires swept through the park, causing changes in canopy composition in the dry forest and decreased species diversity in the wetland. *Typha domignesis* (cattail), a species which responded more positively to the altered conditions than many of the other native species, began to spread throughout the wetland³.

Outside of Palo Verde National Park, major landscape-scale changes were affrонт in the Tempisque River basin. *El Proyecto Riego Arenal-Tempisque* (PRAT), sponsored by the Interamerican Development Bank, enabled intensive rice and sugarcane production in the southern reaches of the Tempisque Basin through the construction of 234 km of irrigation canals⁴. As a result of the new infrastructure, a higher percentage of land in the TB was placed in agricultural production and a percentage of flows which would normally reach the Palo Verde wetland were instead used to irrigate rice and sugarcane fields. Although little data are available, the change in land use likely instigated a decline in water quality, including potential increases in pesticide and nutrient levels and changes in salinity and dissolved oxygen.

Current Ecological Status of Palo Verde National Park

All of these changes in both Palo Verde National Park, and in its contributing watershed, have resulted in major ecological consequences. Though Palo Verde was historically important for over 60 species of birds, only about half of these species are now found in the wetland in the

² *Recomendaciones Tecnicas para la Restauracion Hidrologica del Parque Nacional Palo Verde*, 49. Organizacion para Esudios Tropicales.

³ Vaughan, C; McCoy, M.; Fallas, J.; Chaves, H.; Barboza, G; Wong, G.; Carbonell, M. *Plan de Manejo y Desarrollo del Parque Nacional Palo Verde y Reserva Biologica Lomas Barbudal*, Contrato SSENARA-BID-MINAE-UNA (1996).

⁴ Daniels, E. *Protected area management in the watershed context: A case study of Palo Verde National Park, Costa Rica*, 49. Masters Thesis, University of Florida (2004).

absence of active management⁵. Managers and scientists have attributed this decline to the spread and subsequent dominance of *Typha*, which has reduced the number of espejos de agua, or open pools of water, in the wetland and has decreased habitat heterogeneity and plant species diversity. Without active management, *Typha* covers approximately 95% of the Palo Verde wetland⁶.

General info about Ramsar

Perhaps the most distinctive feature of the Ramsar convention is the focus on “wise use” of wetlands. In the context of wetland protection, the convention defines wise use as “the maintenance of their ecological character⁷, achieved through the implementation of ecosystem approaches, within the context of sustainable development”. The important thing to note about this wording is that the Ramsar convention focuses foremost on protection of wetlands because of their utility for human communities, and not protection “for protection’s sake.” This anthropocentric approach to wetland conservation is important because it invites human use of wetlands as long as this use can integrate sustainably with the ecology of the wetland, though the Convention is quick to point out that ‘development’ is not an objective for every wetland.⁸

In addition, the inner annexes of the Ramsar convention, while typically believed to be “soft law,” in the sense that they are non-binding and not part of the original treaty that was ratified by Costa Rica when they became a signatory to the convention, may actually be legally binding.⁹ For example, the proper interpretation of “wise use,” which is a fairly ambiguous phrase, can be found within the annexes to the convention, some of which were actually created after Costa Rica’s original ratification of the treaty. This means that Costa Rica may actually be legally obliged to follow the idea of “wise use” as it is typically understood within the Ramsar convention under the threat of a suit that mandates active management in this way.

The Montreux List

The Montreux list is a database of Ramsar sites that require particular attention for conservation of their ecosystems. While different parties can provide suggestions for sites that

⁵ Trama, F. *Manejo Activo y Restauracion del Humedal Palo Verde: Cambios en las Coberturas de Vegetacion y Respuesta de las Aves Acauticas*, 67-80. Masters Thesis, Universidad Nacional, Costa Rica (2005).

⁶ Trama, F.; Rizo-Patron, F.; Kumar, A.; Gonzalez, E.; Somma, D.; McCoy, M., *Wetland Cover Types and Plant Community Changes in Response to Cattail-Control Activities in the Palo Verde Marsh, Costa Rica*, 285, *Ecological Restoration*, 27, 3 (September 2009).

⁷ Defined as “the combination of the ecosystem components, processes and benefits/services that characterise the wetlands at a given point in time.” This definition leaves much room for interpretation of a site’s ecological character, something important for Palo Verde considering the unique evolution of the Palo Verde ecosystem in the context of intensive cattle grazing.

⁸ Resolution IX.1 Annex A. A Conceptual Framework for the wise use of wetlands and the maintenance of their ecological character.

⁹ A resort being built within the buffer-zone of a Ramsar site in the Netherlands Antilles had been approved for construction, but was subsequently denied based on the resort's failure to prepare an environmental impact assessment. This was an element interpreted solely within the Ramsar appendices as necessary to comply with another Ramsar requirement - the duty for wise use and the duty to be informed of changes in the ecological character of a wetland - found in the main body of the treaty. (*Ramsar soft law is not soft law at all*)

should be included in the Montreux list, only the contracting state has the final authority to add or remove a site from the list. While the non-binding nature of the Ramsar convention may make the designation or removal of a site from the list seem ambiguous or unimportant, Costa Rica has an interest in maintaining a dignified standing in the international community that requires a legitimate reason for removing Palo Verde from the Montreux list.

Additionally, one of the requirements for a country that joins the Ramsar convention is promoting international cooperation in their preservation of wetlands, especially as it relates to protection of migratory waterfowl species. This specific focus on waterfowl will therefore inform the goals necessary for removing Palo Verde from the Montreux list

Key Stakeholders

Assessing the groups that have a stake in Palo Verde National Park requires looking at not only those individuals and entities who utilize the resources, but also those whose actions affect the resources in some significant way. Undoubtedly the most important group is the Ministerio del Ambiente, energía y Telecomunicaciones (MINAET). MINAET administers the park, and is the management authority for Ramsar.¹⁰ As a governmental organization, MINAET has plentiful resources and a great deal of influence.

Additionally, a new stakeholder of note was recently created to be a part of MINAET. In June of 2012, Costa Rica created the Viceministerio de Agua y Mares. The Vice-Minister, Jose Lino Chaves Lopez will be responsible for updates on rivers, seas, and wetlands. It will be interesting to see what position he takes on the progress of the park, and any recommendations he might make.¹¹ The Ramsar Convention is also an important stakeholder from a management standpoint.

Another important set of stakeholders are the ranchers, farmers, and fishermen whose livelihood comes either directly or indirectly from the resources connected to Palo Verde. Rice, sugarcane, and melon farmers all operate on the outlying areas of the park. Agriculture affects the resources of the park by disrupting the flows in the Tempisque through consumption, as well as increasing the nutrient loads that flow into the wetlands.¹² Ranching, in particular cattle grazing, is prevalent in some areas surrounding the park. Ranchers have a special stake in the park given the cattle solution that is presently being considered for managing the *Typha* in the wetlands. The Costa Rican National Service of Subterranean Waters, Irrigation, and Drainage (SENARA) is an important agricultural/management stakeholder, as it manages the irrigation services in Guanacaste.¹³

Restoration in Palo Verde National Park

¹⁰ Ramsar *Procedure Management Guide*, Report No. 39 (1998).

¹¹ *Costa Rica Creates Vice-Minister of Water and Seas*, Costa Rica News, <http://insidecostarica.com/dailynews/2012/june/15/costarica120061504.htm> (June 15, 2012).

¹² *Procedure Management Guide*

¹³ *Id.*

Given the sharp ecological changes which have taken place in PVNP, managers have begun management to restore ecological integrity to the wetland. To restore flow from *Quebrada Huerton*, managers constructed a dike to channel water through the Puerto Chamorro road into the wetland. However, further restoration measures, proposed in a document by the Organization for Tropical Studies (OTS), are necessary to complete hydrologic connectivity between the creek and the Palo Verde wetland. OTS outlines numerous other recommendations for restoring the natural hydrologic regime in the Palo Verde wetland in this document¹⁴. Additionally, OTS and UICN have jointly proposed Environmental Flow recommendations for the Tempisque River in their 2008 report¹⁵. Implementation of the recommendations proposed in each of these documents has been limited thus far.

In addition to hydrologic restoration, park personnel have implemented intensive active management practices to remove the *Typha* and promote the growth of other native plant species. First, managers have used a *fanguero*, a plow-like machine, to mechanically remove *Typha*, and expose its roots and tubers. These tubers then need to be removed or killed in-situ to prevent re-emergence. Researchers have tested the *fanguero* method during different periods of the yearly wet and dry seasons, and have found that effectively coupling the *fanguero* with seasonal hydrology can more effectively kill the roots and tubers. A *fanguero* can expose roots to dry air and hot sun (dry season), or can expose roots which are then drowned in deeper water (wet season)¹⁶. Alternatively, park staff have used cattle as a management tool to graze on exposed *Typha* tubers, and prevent re-sprouting after *fanguero* management¹⁷.

Restoration Complications and Research

Throughout the restoration process in Palo Verde National Park, managers have encountered complications, and have also learned more about the ecology of the site. In light of scientific findings and management result overs the last two decades, the following questions stand out as as an important starting point for restoration at PVNP, with management and legal activities dependent upon their answers.

To what extent can the Palo Verde wetland ecosystem be restored to its pre-1980 conditions?

Typha domignensis is a wetland plant notorious for creating “regime shifts,” or a shift to a new type of ecosystem which is at equilibrium, or “stable.” Once this new ecosystem exists,

¹⁴ *Recomendaciones Tecnicas para la Restauracion Hidrologica del Parque Nacional Palo Verde*, 49. Organizacion para Esudios Tropicales.

¹⁵ Alvarado, J.; Jimenez, J.; Gonzalez, E.; Pizarro, F.; Jimenez, A., *Determinación preliminar del caudal ambiental en el río Tempisque, Costa Rica: el enfoque hidrológico con limitación de datos*, Kurú: Revista Forestal (Costa Rica), 5, 13, (2008)

¹⁶ Osland, M.; Gonzalez, E.; Richardson, C., *Restoring diversity after cattail expansion: disturbance, resilience, and seasonality in a tropical dry wetland*, *Ecological Applications*, 21, 3, 715-728 (2011).

¹⁷ Jorge Gamboa, MINAET, personal communication.

restoring the site back to its original species composition is difficult, and often impossible without constant and continued management intervention. The reason for this difficulty is that *Typha* creates conditions which promote its own perpetuity and prevent other plants from dominating or co-dominating the site. For example, when *Typha* sheds its long, broad leaves, these leaves cover the surface of the wetland and prevent seed germination and growth of other species¹⁸. With multiple mechanisms for competing with other species, *Typha* readily spreads back into a previously cleared site a few years after removal by *fanguero* if not managed repetitively. In many studies in PVNP, researchers found that the *fanguero* method successfully eradicated *Typha* for a time, but that the species eventually began encroaching into the plot from surrounding patches^{18,19}.

With continuous monitoring of cattail encroachment throughout the restoration process, and further literature review, land managers and scientists will develop a better understanding of the potential for removing cattail as a dominant species. Since cattail has resulted in a dramatic decline in wetland species diversity, and its biodiversity contributes to its international importance, then its eradication should first remain a top priority for PVNP restoration. However, if long term cattail eradication is not possible in PVNP, then decision makers will need to develop alternative restoration goals for the park that do not include removing cattail as a dominant species. Alternatively, long term cattail removal may be possible only with continuous management into perpetuity. If so, then decision makers will need to consider the required economic resources for this management and determine whether eradication is feasible in the long term.

How important is hydrologic restoration for eradicating cattail in the long term?

Hydrology is one of the most important determinants of plant species composition. Because of this, anthropogenic alterations in quantity, duration, and timing of water inputs can potentially result in dramatic ecosystem changes²⁰. Often these changes cannot be reversed without restoring the hydrology of the ecosystem back to the hydrologic regime to which the native plant species are adapted. Given its pervasive presence in the wetland, cattail is well adapted to the current hydrologic conditions in PVNP. Restoring hydrologic conditions which are more appropriate for other species and less appropriate for *Typha* may be essential for the long-term success of PVNP restoration.

¹⁸ Osland, M.; Gonzalez, E.; Richardson, C., *Restoring diversity after cattail expansion: disturbance, resilience, and seasonality in a tropical dry wetland*, Ecological Applications, 21, 3, 715-728 (2011).

¹⁹ Trama, F.; Rizo-Patron, F.; Kumar, A.; Gonzalez, E.; Somma, D.; McCoy, M., *Wetland Cover Types and Plant Community Changes in Response to Cattail-Control Activities in the Palo Verde Marsh, Costa Rica*, 285, Ecological Restoration, 27, 3 (September 2009).

²⁰ Hupp, C. R., *Hydrology, geomorphology and vegetation of coastal plain rivers in the south-eastern USA*. Hydrological Processes, 14, 16-17, 2991-3010 (2000).

Poiani, K. A., & Johnson, W. C. *A spatial simulation model of hydrology and vegetation dynamics in semi-permanent prairie wetlands*. Ecological Applications. 279-293, (1993).

To make an informed decision about hydrologic components of restoration, land managers and scientists should review the literature on the relative importance of hydrology in the restoration of other *Typha* dominated wetlands. If hydrology is indeed an essential component, then the hydrologic recommendations proposed by OTS should be given appropriate weight in the restoration plan. This may include legal backing and an implementation plan.

Can Typha, which requires ongoing and continuous management, be more effectively eradicated by re-introducing a high density of cattle to the wetland?

Historically, the Palo Verde wetland was an operating *hacienda*, with its ecology controlled in part by continuous intensive grazing. Along with altered hydrology and water quality, prolonged and intense drought, and changes in fire regime, cattle removal may have played a role in the shift in plant species composition in the Palo Verde wetland. At the present time the wetland is instead dominated by *Typha domignensis* rather than the diverse array of plant species present prior to 1980. This new species composition therefore provides a very different type of cattle pasture for grazers than was present in prior times. Because of this, the ecological effects of grazing on this new type of ecosystem may be different than those in the previous ecosystem. Research findings on the effects of cattle grazing on the Palo Verde wetland are mixed, and the potential role of cattle in the park requires further investigation.

Some researchers and managers at Palo Verde have found that cattle grazing is a useful mechanism for controlling *Typha* tubers following *fangueo* treatment, and that they therefore “finish the job” of *Typha* eradication after the plants have been uprooted²¹. However, managers have suggested that the current intensity of grazing is not sufficient for controlling cattail. Conversely, the most recent findings of Osland et al. showed that plots which were excluded from cattle grazing after *fangueo* treatment had a greater number of species and had no significant difference in cattail cover from grazed plots²².

To date there has not been a study on the effect of grazing at varying intensities in the park. By implementing such an investigation which also compares the effects of grazing with other potential management strategies, managers and decision-makers can make a more informed decision on the incorporation of intensive grazing into PVNP restoration and make appropriate legal changes to permit this practice.

Removing PVNP from the Montreaux Record and Achieving Restoration

After addressing the above questions, land managers can develop appropriate restoration goals for Palo Verde National Park. These goals should maximize the ecological potential of the

²¹ Burnidge, W. S. *Cattle and the management of freshwater neotropical wetlands in Palo Verde National Park, Guanacaste, Costa Rica*, Thesis, University of Michigan, (2000).

Jorge Gamboa, MINAET, personal communication.

²² Osland, M.; Gonzalez, E.; Richardson, C., *Restoring diversity after cattail expansion: disturbance, resilience, and seasonality in a tropical dry wetland*, *Ecological Applications*, 21, 3, 715-728 (2011).

wetland while also recognizing practical and economic constraints. By setting concrete restoration goals, land managers can better develop an implementation scheme, and establish benchmarks and a relevant monitoring strategy.

Restoration goals should correspond as much as possible with the four criteria for which PVNP was designated by Ramsar as a Wetland of International Importance. When restoration goals are developed with these criteria in mind, then policy makers and managers can develop definitive criteria for removing PVNP from the Montreaux Record. Furthermore, if definitive restoration goals are incorporated into the upcoming management plan for Palo Verde National Park, then management practices implemented to achieve these goals become legally binding.

Restoration Goals

The following are suggested restoration goals for Palo Verde National Park (in order of importance). Actual restoration goals should be established by collaboration between PVNP personnel, Costa Rican environment officials, and Ramsar-affiliated scientists. Goals should also incorporate economic and practical constraints.

- 1) Diversity of wading birds should be restored to pre-1980 numbers. Wading and migratory birds are emphasized in two of the four Ramsar criteria for listing PVNP. Additionally, migratory birds are of specific international concern due to their migration between countries.
- 2) The PVNP should provide sufficient appropriate habitat for supporting the above number of bird species. This includes the presence of *espejos de agua*, and may also include hydrologic management and changes in the plant community.
- 3) Populations of the following endangered species should be present and stable in the park: jabiru (*Jabiru mycteria*), scarlet macaw (*Ara macao*), American crocodile (*Crocodylus acutus*), jaguar (*Panthera onca*) and the black-handed spider monkey (*Ateles geoffroyi*).
- 4) *Typha domignensis* cover should be no greater than 10% in the park. The plant community should generally resemble that of a wetland in a tropical dry forest region.

Montreaux Record Removal Criteria

The following are suggested criteria for removing Palo Verde National Park from the Montreaux Record. Actual criteria should be established by collaboration between PVNP personnel, Costa Rican environment officials, and Ramsar-affiliated scientists. Criteria should be set to a level at which complete restoration (or accomplishment of the established restoration goals) is inevitable, but which is also achievable in a shorter period of time, as complete restoration could take decades.

- 1) A complete restoration plan is written for PVNP and resources are in place for its implementation.
- 2) 85% of pre-1980 bird species are present in the park.
- 3) Appropriate habitat, including *espejos de agua*, is present in the park, and total area has increased for at least five years.
- 4) The following endangered species are present in the park: jabiru (*Jabiru mycteria*), scarlet macaw (*Ara macao*), American crocodile (*Crocodylus acutus*), jaguar (*Panthera onca*) and the black-handed spider monkey (*Ateles geoffroyi*).
- 5) Cover of *Typha domingensis* is no greater than 30% of the park, and total cover has decreased for at least five consecutive years.

Delisting a site from the Montreux Record is a process that begins and ends with the contracting party - in this case, the government of Costa Rica. Once the party believes it is in the site's best interest to delist, they make a request to the Convention Bureau. A review panel makes comments and suggestions after assessing the park's progress. Additionally, a party may request a field team to do a visit to the site. The findings are forwarded to the contracting party, who then makes the final decision about delisting the site.

What Ramsar sees as restoration/examples of sites removed from Montreux

Because of Costa Rica's interest in maintaining a dignified standing within the international community, it is necessary to have an accurate idea of what "restoration" means for the RAMSAR convention. The return of Palo Verde into unthreatened wetlands, and its removal from the Montreux list, can therefore be seen as a legitimate action of a signatory to the RAMSAR convention. The clearest way to approach this goal is to examine other RAMSAR sites that have been removed from the list.

The Lake Oswin site in Poland provides a good example. The initial reason that Lake Oswin was placed on the Montreux list was that hydrological changes in the lake caused by the building of a dam had decreased the biodiversity of the site by changing the typical conditions of the ecosystem. In terms of restoration, the primary focus was not on the complete return of biodiversity to the ecosystem, but was rather the use of a remedy that restored the initial hydrological system accompanied by signs that biodiversity was returning. This also involved a detailed management plan for monitoring the changes occurring that had also been agreed to by "local groups of interest". (*key_montreux_poland_seven*)

Another example is Mauritania's Parc National du Diawling, which was delisted from the Montreux Record in 2009.²³ The park's ecology, like Palo Verde's, had been adversely affected by invasive species, both *Typha* and *Salvinia Molesta*.²⁴ A mission was sent in 2000 to assess the situation, and both biological and mechanical solutions were implemented within the park.²⁵ The park was delisted primarily because of the success of the biological solution, which was the introduction of a species of weevil that eliminated much of the *salvinia*.²⁶ According to Ramsar, "visible signs" of the regression of the invasive species were indicative of restoration.²⁷ Also important was the subsequent return of certain fauna to the area after the *salvinia* was controlled.²⁸

Because the government of Costa Rica has the final say in when Palo Verde will be removed from the Montreux list, one of the most important questions for an analysis of potential recommendations is what Costa Rica will actually consider as restoration. The original ecosystem of Palo Verde was created in a unique situation of intensive cattle ranching, and it is at least possible that the removal of this cattle was the primary cause of the influx of cattail and destruction of the waterfowl habitat. Therefore, one of the questions presented is whether Costa Rica should approach restoration of the wetland as a recreation of what Palo Verde probably looked like 250 years ago before cattle were ever within the wetland, or whether restoration will mean the recreation of the conditions that existed only 30 years ago; namely, intensive use of cattle in the wetland that maintains waterfowl habitat.

The distinction between these two options can be partially delineated according to the respective goals of the Ramsar convention in comparison to the National Parks law of Costa Rica. Based upon the initial reasons for placing Palo Verde on the Ramsar list, the Ramsar focus on waterbirds in general, as well as the disappearance of the waterfowl being a primary reason for placing Palo Verde on the Montreux list, it seems clear that a return of waterfowl to the wetland could be used as a definite indicator of restoration. It is equally clear, however, that there a number of ways that Costa Rica could approach this goal, and creation of bird habitat could very well be a secondary goal as the park is healed according to the guidelines of the Costa Rican National Parks and Wetlands laws. Considering the scope of this paper, however, we will assume that Costa Rica has a vested interest in removing Palo Verde from the Montreux list according to the guidelines set by the Ramsar convention.

Therefore, the next questions presented concern the use of cattle for restoration. Grazing animals have been used in the management plans of other Ramsar sites with success.²⁹ However,

²³ Kibata, Cynthia, *Removal of Parc National du Diawling from the Montreux Record* http://ramsar.rgis.ch/cda/en/ramsar-news-latest-removal-of-parc-national/main/ramsar/1-26-76%5E23993_4000_0 (August 9, 2009).

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.*

²⁹ The management plan for Lake Oswin, mentioned above, utilized grazing horses. A number of other Ramsar sites have utilized grazing animals (both native and non-native) for their "wise use" management plans.

it remains to be seen whether cows will definitely work for restoration of the bird habitat within Palo Verde because of the confluence of multiple factors that coincided with the degradation of the waterfowl habitat within it, and a number of conflicting papers on the subject. If intensive cattle ranching does create new waterfowl habitat this could be seen as a restoration of an ecosystem element similar to the restoration of the hydrological element in the Lake Oswin site. To make the analogy complete, a combination of intensive cattle ranching, signs that waterfowl were returning to their Palo Verde habitat, and a detailed management plan will be enough to remove Palo Verde from the Montreux list.

In a discussion with **(name)**, a worker in Palo Verde for the **Organization for Tropical Studies**, we were surprised to discover that there are currently cows grazing in Palo Verde after paying a nominal fee (around \$4 per head per month). For the purposes of this paper, we have been operating under the assumption that cows involved in any management plan will have to come from ranchers. Based on the low income of Palo Verde National Park at this point (*citation and footnote*) any use that requires payment on the end of the national parks system will be inherently unsustainable. Furthermore, there is clearly a need for plots of land for cattle grazing in the Palo Verde area, as **(worker)** led us to believe that there was no shortage of ranchers that would be happy to utilize the land. As long as this is the case, the park may also have the ability to charge more per head of cattle utilized within in the wetland than they currently are. This would generate more funds necessary for any other elements within the park's strategy for wise use.

We are also operating under the assumption that there must be an element of congruence between the wise use strategy of Ramsar, and the internal legal framework of Costa Rica. The legal hierarchy of Costa Rica, explained below, does appear to allow use of intensive cattle ranching within Palo Verde. However, there are a number of possible difficulties with legal dissonance between RAMSAR and the national parks law of Costa Rica that would cause unnecessary friction. First, there is a definite legal clash that will accompany utilizing a national park as a *hacienda* because the Costa Rican national parks law does not allow this kind of unnatural interference with otherwise untouched ecosystems.³⁰ Additionally, there must be a consideration of the way that the Costa Rican public will see extensive use of cattle ranching within a national park. Our discussion with **(park guy)** also indicated that the possibility of a negative public reaction is a definite element at play in the consideration of whether to use more intensive cattle grazing within Palo Verde.

UNESCO Biosphere Reserve

There are a number of possible exceptions to management that focuses strictly on intensive cattle grazing. One possible scenario is the inclusion of Palo Verde as a UNESCO biosphere reserve. Biosphere reserves are areas in which sustainable use and conservation go

³⁰ This situation creates an interesting analogy to the current tension in Costa Rica between volcanic national parks and geothermal energy production.

hand-in-hand to facilitate the testing of ideas and methods.³¹ Many Ramsar sites, such as Laguna de Los Pozuelos in Argentina, are also biosphere reserves.³² A reserve consists of three zones: a core area, a buffer zone, and a transition area. This scheme works well with Palo Verde, as it is already (if only rudimentarily) split into similar zones. There is a central section of the park that is designated solely for conservation, similar to a core area. Around much of the park are privately-managed refuges, such as the El Viejo Wetlands³³, which serve as a buffer zone. The outlying areas are already generally used for agriculture and ranching, and would serve as the transition zone.

One of the redeeming qualities of the biosphere reserve is its consistency with Ramsar's "wise use" policy. There is a strong anthropocentric approach with a focus on stakeholder involvement, particularly in the transition zones. There are a couple of opportunities that could arise from making Palo Verde a biosphere reserve. Because the reserves are created as testing grounds, introduction of cattle on a larger scale could occur without legal friction. However, the reserves' zoning scheme calls for "non-destructive research" and "low-impact uses" inside the core areas, which is where the cattle would be introduced.³⁴

If eradicating the cattail with "low-impact uses" is too difficult, it may be possible to utilize the transition zone in such a way that it provides additional habitat for waterfowl. Rice fields are suitable habitat for diverse species of birds, including those in the migratory phase of their life cycle.³⁵ Creating transition zones that are more rice-intensive will allow waterfowl to thrive where they may not have otherwise had sufficient habitat. This type of transition zone may require payment for environmental services or another method for facilitating greater use of the land for rice. Using rice paddies as habitat is precisely the type of "wise use" that is consistent with Ramsar's goals.

- Fangueos (*Osland 2011 Restoring Diversity*) (*Trama et al*)

Marco jurídico costarricense y el caso de Palo Verde

Antes de emitir conclusiones y recomendaciones, es importante entender el contexto jurídico en el que opera el Parque Nacional Palo Verde y las actividades que en él se desarrollan.

El sistema jurídico costarricense ha adoptado el sistema piramidal Kelseniano de la jerarquía de las normas. Según este sistema, la norma superior es la Constitución Política, seguida por los convenios o tratados internacionales debidamente firmados y ratificados, las leyes nacionales, decretos ejecutivos, reglamentos emitidos por el Poder Ejecutivo y estatutos institucionales, y por último las normas sujetas a esos reglamentos. Este sistema jerárquico fue plasmado en el artículo 7 de la Constitución Política de Costa Rica, el cual dicta:

³¹ *Main Characteristics of Biosphere Reserves* <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/>

³² Ramsar *The Annotated Ramsar List: Argentina* http://www.ramsar.org/cda/en/ramsar-documents-list-annotated-ramsar-17044/main/ramsar/1-31-218%5E17044_4000_0 (April 7, 2011).

³³ <http://www.elviejowetlands.com/>

³⁴ *Main Characteristics of Biosphere Reserves*

³⁵ Acosta, Martin et al, *Birds of Rice Fields in the Americas*. Waterbird 33 (Special Publication 1): 105-122 (2010).

“Artículo 7. Los tratados públicos, los convenios internacionales y los concordatos, debidamente aprobados por la Asamblea Legislativa, tendrán desde su promulgación o desde el día que ellos designen, autoridad superior a las leyes. (...)”



La imagen anterior permite ilustrar el orden jerárquico de las normas jurídicas en nuestro país. Este orden también ha sido plasmado en el numeral 6 de la Ley General de la Administración Pública.

Siguiendo el orden establecido por dicha jerarquía, analizaremos las normas implicadas en el caso del manejo activo del humedal Palo Verde.

La **Constitución Política**, en su artículo 50, establece la obligación del Estado de garantizar, defender y preservar el derecho de todo ciudadano a un ambiente sano y ecológicamente equilibrado. Por otra parte, el artículo 89 establece la obligación del Estado de preservar las bellezas naturales, como parte de los fines culturales de la Nación.

El Tratado Internacional en cuestión es la **Convención Relativa a los Humedales de Importancia Internacional Especialmente como Hábitat de las Aves Acuáticas**, conocida como Convención Ramsar. Este instrumento jurídico fue ratificado por Costa Rica el 9 de abril de 1991, mediante la ley número 7224, y entró en vigencia el 8 de mayo de 1991. A la luz del artículo 7 de la Constitución Política, este Tratado Internacional tiene fuerza de ley, por cuanto ha sido integrado al ordenamiento jurídico nacional, pero en un rango superior a la ley ordinaria nacional. El principal problema con respecto al caso del humedal Palo Verde, en comparación con la legislación nacional, es el establecimiento de la explotación racional (“wise use”) de los humedales y de las poblaciones migrantes de aves acuáticas, en beneficio del desarrollo sostenible.

En cuanto a la legislación nacional sobre humedales y Parques Nacionales, las normas son variadas y se encuentran dispersas en distintos cuerpos normativos.

La **Ley del Servicio de Parques Nacionales**³⁶, en su artículo 8, prohíbe un número de actividades dentro de los Parques Nacionales, dentro de las cuales se encuentra pastorear y

³⁶ Número 6084, emitida el 24 de agosto de 1977.

abreviar ganado y cualquier actividad comercial o agrícola. En el mismo sentido, el artículo 12 establece que no puede otorgarse concesiones para la explotación de productos de los Parques Nacionales. Un punto importante en esta Ley es el objetivo de la misma, pues en su artículo 1 indica que el desarrollo y administración de los parques nacionales para la conservación del patrimonio natural del país será la función específica del Servicio de Parques Nacionales. Remitiéndonos a la voluntad del Legislador, este objetivo podría ser la base para interpretar que las actividades realizadas para preservar o recuperar un Parque Nacional (o una zona del mismo) podrían ser permitidas, aún si se encuentran en la lista de actividades prohibidas establecida en el artículo 8.

La ley número 6794, **Ley de Creación de Parques Nacionales y Reservas Biológicas que ratifica como Leyes los Decretos Creadores de Parques Nacionales y Reservas Biológicas**³⁷, ratifica como ley de la República el decreto ejecutivo número 11541, del 30 de mayo de 1980, el cual creó el Parque Nacional Palo Verde. Las razones para la creación del Parque Nacional fueron la existencia de bosques secos tropicales, ecosistema muy escaso en el país; la existencia de sitios de importancia para la conservación de aves migratorias y residentes; la diversidad de fauna silvestre en la zona; y la existencia de ecosistemas de gran variedad de flora.

La **Ley Orgánica del Ambiente**³⁸ establece, en su artículo 41, que los humedales y su conservación son temas de interés público, al ser ecosistemas que brindan múltiples servicios y usos al país. El artículo 42 faculta al Ministerio de Ambiente y Energía para que establezca planes de ordenamiento y manejo de los humedales, para combatir la contaminación o degradación de los mismos.

Por otra parte, la **Ley de Biodiversidad**³⁹, en su artículo 58 establece que “las áreas silvestres protegidas son zonas geográficas delimitadas, constituidas por terrenos, humedales y porciones de mar. Han sido declaradas como tales por representar significado especial por sus ecosistemas, la existencia de especies amenazadas, la repercusión en la reproducción y otras necesidades y por su significado histórico y cultural. Estas áreas estarán dedicadas a conservación y proteger la biodiversidad, el suelo, el recurso hídrico, los recursos culturales y los servicios de los ecosistemas en general.” Este artículo es de suma importancia para el presente análisis, pues establece que los humedales tiene categoría de área silvestre protegida.

Avanzando en la jerarquía normativa, encontramos ahora los decretos ejecutivos. En este caso en particular, el decreto número 27345-MINAE **Establece para el Parque Nacional Palo Verde Manejo Activo en sus Humedales y Áreas de Pasto y Crea Comité Asesor**⁴⁰. Emitido el 18 de agosto de 1998, este decreto ejecutivo desarrollar las razones por las cuales es necesario establecer un régimen de manejo activo del Parque Nacional. Dentro de estos motivos se cita que el objetivo de la creación de las Áreas Silvestres Protegidas (categoría a la que pertenecen los humedales) es conservar los ecosistemas representativos; que entre los objetivos fundamentales

³⁷ Número 6794, emitida el 24 de agosto de 1982.

³⁸ Número 7554, emitida el 4 de octubre de 1995.

³⁹ Número 7788, emitida el 30 de abril de 1998.

⁴⁰ Número 27345-MINAE, emitido el 18 de agosto de 1998.

del Parque Nacional Palo Verde está el proteger, manejar, conservar y restaurar, tanto ecosistemas de humedales como de bosque tropical seco; que la Convención Ramsar fue ratificada por Costa Rica, y por su carácter de tratado internacional tiene valor superior a la ley; que los ecosistemas del Parque Nacional han sufrido cambios drásticos en su estructura y funciones; que algunos sectores del Parque Nacional han sido invadidos por algunas especies de plantas (por ejemplo, la typha); que el objetivo del decreto bajo análisis es conservar las poblaciones de aves acuáticas mediante el manejo activo de los humedales en el Parque Nacional, para mantener la diversidad; que el pastoreo controlado en zonas de humedal ha producido control parcial de las especies invasivas; que el manejo activo (como combinación de métodos de intervención sobre los ecosistemas, de manera planificada y dirigida a la restauración ecológica) es una herramienta útil y necesaria para el manejo del Parque Nacional: que dicho manejo activo puede incluir el pastoreo, fanguero, corta de vegetación, rehabilitación de esteros, introducción de manejo de aguas, entre otros.

El decreto ejecutivo, en su artículo 1 establece que las intervenciones que se llevarán a cabo en el Parque Nacional Palo Verde estarán basadas en el Plan de Manejo del Parque Nacional Palo Verde, los compromisos con la Convención Ramsar y la asesoría del Comité Asesor que se crea en este instrumento jurídico.

El artículo 2 del mismo cuerpo normativo establece la posibilidad de realizar cualquier actividad que se considere necesaria para mantener la biodiversidad del Parque. Consideramos que el hecho de que el Legislador haya mantenido abierta la posibilidad de realizar las acciones necesarias, en vez de establecer taxativamente las actividades permitidas, permite un manejo adaptativo de los humedales, sin la necesidad de modificar el decreto ejecutivo en caso de que otras actividades, diferentes a las establecidas, sean necesarias y adecuadas.

Avanzando en la jerarquía de las normas, analizaremos ahora el **Plan de manejo y desarrollo del Parque Nacional Palo Verde y Reserva Biológica Lomas Barbudal**.⁴¹ Este instrumento fue emitido en diciembre de 1996, luego de finalizar un proceso de elaboración de 3 años, con participación activa de profesionales expertos en el tema. La Contraloría General de la República ha delimitado que “un plan general de manejo es el instrumento de planificación que permite orientar la gestión de un área silvestre protegida, o de un sitio Ramsar, hacia el cumplimiento de sus objetivos de conservación a largo plazo y es la base para el desarrollo de otros instrumentos de planificación y reglamentación de estas áreas.”⁴² La naturaleza jurídica de este acto fue aclarada por la Contraloría General, al expresar que estos constituyen un acto reglamentario, es decir, un Reglamento emitido por el Poder Ejecutivo. Asimismo, el dictamen de la Contraloría General indica que "(...) el Plan es un acto normativo y regulador de todas aquellas de sus partes que expresan claramente una voluntad de regir para el futuro el contenido y las limitaciones del suelo a que se refieren, indicando qué es lo que el propietario, público o

⁴¹ Emitido en 1996.

⁴² Contraloría General de la República de Costa Rica, Informe de los resultados de la auditoría operativa acerca del cumplimiento por parte del Estado de las medidas de protección y conservación de los Humedales de importancia internacional (Convención Ramsar), número DFOE-AE- IF-13-2011, del 30 de noviembre de 2011, p. 22

privado, puede hacer o no hacer sobre éste último... Se trata de una norma de naturaleza reglamentaria, aún cuando no haya sido emitido como Decreto Ejecutivo.”⁴³

El Plan de Manejo citado establece que el manejo de los humedales, y específicamente el control de la typha, debe realizarse mediante la corta de esta planta con machete, el fanguero con tractores y el pastoreo de un número controlado de ganado. Hasta el momento, estas son las actividades que se han realizado en los humedales del Parque Nacional Palo Verde.

En 2001, el Ministerio de Ambiente y Energía, en conjunto con la UICN, publicó la **Política Nacional de Humedales**.⁴⁴ Este documento establece una serie de principios que brindaran dirección al MINAE y otros entes relacionados, para una gestión sostenible de los recursos de los humedales en el país. Al ser una guía de acción, no tiene ninguna fuerza jurídica, es decir, no es vinculante. Únicamente establece los lineamientos, políticas, y principios generales recomendados para el manejo y desarrollo de los humedales nacionales.

El objetivo general de esta Política Nacional de Humedales es “fomentar la conservación y el uso racional de los ecosistemas de humedales mediante la acción coordinada de la sociedad y el Gobierno”. Esto implica un manejo activo de los humedales, y un intento de cumplir con lo establecido en la Convención Ramsar en cuanto al uso racional de estos ecosistemas.

Análisis sobre el aparente conflicto entre las normativa sobre parques nacionales y humedales

Al analizar la legislación pertinente al caso, surge la interrogante de si existe un conflicto entre las normas sobre el manejo y uso de los parques nacionales y las referentes a uso y manejo de los humedales. En esta sección analizaremos las dos perspectivas del aparente conflicto: la Convención Ramsar vs. la Ley del Servicio de Parques Nacionales, y esta última vs. la normativa nacional referente a humedales

Convención Ramsar vs. Ley del Servicio de Parques Nacionales

El aparente conflicto surge por el establecimiento de la obligación de los países parte de la Convención Ramsar de realizar un “uso racional” y manejo activo de los humedales (que en el caso concreto de Palo Verde sería fanguero y pastoreo de ganado); mientras que la Ley del Servicio de Parque Nacionales establece la prohibición expresa de que exista ganado o pastoreo en los parques nacionales.

El artículo 7 de la Constitución Política y el artículo 6 de la Ley General de la Administración Pública (ambos analizados supra) resuelven este asunto. Al tratarse de un tratado internacional debidamente firmado y ratificado por Costa Rica (Convención Ramsar), este se encuentra en un nivel superior que las leyes nacionales, y por lo tanto se encuentra por encima de la Ley del Servicio de Parques Nacionales.

En un sistema jurídico ideal, las normas de un rango inferior no deben contrariar a las de carácter superior. Sin embargo, como se indicó en la sección anterior y se analizará a

⁴³ Op. cit

⁴⁴ Ministerio de Ambiente y Energía. Política de Humedales de Costa Rica, 2001. Disponible en <http://eco-book.net/pg/file/Pacto/read/667/politica-de-humedales-de-costa-rica>

continuación, las normas nacionales referentes a humedales sí se encuentran alineadas con las políticas de uso y manejo establecidas por la Convención Ramsar.

Ley del Servicio de Parques Nacionales vs. normativa sobre humedales

Este aparente conflicto nace por la misma prohibición establecida en la Ley del Servicio de Parques Nacionales, y la Ley de Biodiversidad, Ley Orgánica del Ambiente, el decreto ejecutivo 27345-MINAE (establece el manejo activo del Parque Nacional Palo Verde) y el plan de manejo del Parque Nacional Palo Verde.

Sobre este punto, Rojas y González opinan: “Antes de la promulgación de la Ley Orgánica del Ambiente, cuando se declaraban vía decreto humedales, éstos podían estar dentro de algunas categorías de manejo existentes, ya fuera Refugio de Vida Silvestre, Reserva Biológica, Parque Nacional, etc. o quedar en propiedad privada. Con la normativa establecida en el artículo 32 de la Ley Orgánica del Ambiente los humedales son una categoría de manejo y se podrán establecer dentro de éstos áreas silvestres protegidas, es decir, adquieren su propia categoría de manejo.”⁴⁵

Analizando el asunto desde la perspectiva de los principios generales del Derecho, una posible solución sería aplicar el principio “norma especial deroga a norma general”, por medio del cual la normativa relativa a humedales sería superior a la referente a Parques Nacionales, ya que las primeras son especiales y específicas para un ecosistema determinado.⁴⁶

Por otro lado, la Ley Orgánica del Ambiente faculta al MINAE para que establezca planes de manejo en los parques nacionales, lo cual implica una aceptación del manejo activo de estas áreas protegidas.

⁴⁵ Aguilar Rojas, Grethel; González Aguiluz, Marcia. Manual de Legislación sobre Humedales de Costa Rica, p. 42. Disponible en <http://eco-book.net/pg/file/Pacto/read/615/manual-de-legislacion-sobre-humedales-de-costa-rica>

⁴⁶ “(...) debido a la importancia de los humedales, aunque muy escasas existen normas específicas y especiales que aplican a este tipo de ecosistemas, como lo son las que se establecen en el Capítulo VII de la Ley Orgánica del Ambiente. Lo cual no significa que esta normativa no pueda aplicarse si los humedales forman parte de otra clase de manejo de área silvestre protegida, pues como se mencionó al inicio del trabajo, usualmente contienen humedales.” Salazar Bejarano, Raquel. Régimen Jurídico de los Humedales en Costa Rica, 2004, p. 54.

Conclusions and Recommendations

1. Legal and institutional recommendations

1) To maintain the existing legal framework, exactly as it is right now. This recommendation can be accepted if the decision makers decide that there is no conflict between the Ramsar Convention and the national laws involved in this case.

2) If the decision makers consider that there is a legal conflict, a possible solution would be to amend the National Park's Service Law, to include a new article allowing the activities that are necessary to preserve and restore the ecosystems within the Park, based on technical reports and criteria. These activities should be authorized only to achieve preservation and restoration, and should not be extended to any other purposes.

3) To officialize the Palo Verde National Park's Management Plan through a publication as an Executive Decree.

4) To strengthen the environmental education in the region, paying special attention to the importance of the Palo Verde National Park, its wetlands and the implications of being a Ramsar site.

5) Assure the economic resources to maintain the *fangueo* tractors.

Adaptive Management

Because of the lack of conclusive data that is inherent in the studies concerning the cause of the influx of *Typha* in Palo Verde, it is impossible for us to provide concrete recommendations for a proper management plan over the course of more than a few years. This highlights our first and most immediate recommendation which is to utilize isolated plots of intensive cattle grazing over a short period like 5 years to gauge the effects of cattle grazing across the entire wetland.

Allowing intensive cattle grazing in a restricted area of the park for only a 5 year period presents a much easier legal venture than attempting to justify the perpetual use of a significant number of cattle under a justification of the "management" exception within the Costa Rican wetlands law and the creation of a new *decreto*. Limiting the timescale to a relatively short period is also congruent with the concerns expressed above about a sudden influx of cattle into a relatively pristine Costa Rican national park in a period of recovery. Finally, justifying a limited venture will be much easier to explain to a public that is potentially alarmed or irritated by a veritable *hacienda* within a national park.

If it appears that cow ranching does not work after a five year period, Costa Rica could designate Palo Verde as a biosphere reserve. This option allows the park to conduct the testing and experimentation necessary to come up with a proper solution, while maintaining the status and image of the park as a conservation area. The schemes implemented in the biosphere reserves gel with Costa Rica's exception to the wetlands law that allows for zoning. There is a potential conflict, however, if the active management strategy UNESCO advocates clashes with the national parks law. Even if the law allows for this type of management, it is still best to

eliminate potential inconsistencies. Overall, this is certainly a viable solution given the flexibility it provides.

If the experiment does appear to work, however, the best available option for the wetlands will be a slow expansion of both the number of cattle used, as well as the area for grazing. The eventual goal of this adaptive management scheme would be to eventually include the entire area of the wetlands that is necessary for the bird habitat. This will include restrictions on where the cattle can go within Palo Verde, keeping in mind that their presence is meant foremost as a restorative management tool for bird habitat.

Incorporating an adaptive management plan like this would already be legitimate at this point considering the active management *decreto* that was passed in (???). However, to make a new approach to the adaptive management of Palo Verde official a new *decreto* should be established. This would serve the dual purpose of concretizing the management plan within the legal authority of Costa Rican law, as well as providing a concrete management plan that would allow the RAMSAR convention to have a tangible idea of what it entailed.

Research Recommendations

- 1) Managers and scientists should investigate the impacts of grazing in varying intensities as a potential management tool. A study which compares grazed plots with ungrazed plots and also compares the effects of hydrologic management would provide valuable information on the restoration requirements of PVNP.

- 2) A long-term monitoring plan should be implemented to document the long-term response of *Typha* to management. Such information would show whether management can effectively remove cattail in the long-term or whether future encroachment is inevitable after a period of time.

Planning Recommendations

- 1) Conduct preliminary research for setting appropriate restoration goals for Palo Verde National Park (hydrology, grazing, *Typha* ecology)
- 2) Establish a core network of personnel from PVNP, OTS, MINAET, and Ramsar to plan Palo Verde restoration.
- 3) Using this established team, set clear restoration goals for the park. These goals should align as much as possible with Palo Verde's original Ramsar listing criteria.
- 4) Develop criteria for removal of PVNP from the Montreux Record. These criteria should be set to a level at which full restoration (i.e. accomplishment of restoration goals) is inevitable, but could be achieved in a shorter period of time, as full restoration could take decades.
- 5) Develop an implementation plan for achieving restoration goals with available resources.
- 6) Establish a clear monitoring program.