San Jose Northern Subcatchments (SJNS), Costa Rica

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LANDSCALE | FUNDECOR LABORATORIO VIVO DE MI PAISAJE | IUCN | Agua Tica

About this report

This report outlines key results obtained from an assessment of the sub-catchments of Virilla and Río Grande in Costa Rica. The IUCN Regional Office for Mexico, Central America and the Caribbean (IUCN-ORMACC) conducted the assessment from September 2020 to February 2021 using version 0.2 of the LandScale assessment framework and guidelines. Results validation and refinement were completed in late May 2021 by LandScale.

In order to include the diversity of stakeholders' interests, IUCN-ORMACC convened all actors from relevant productive sectors (trade unions, producer groups, traders/exporters) and existing initiatives to ensure their involvement in the assessment process. The project joined forces with Agua Tica, a water fund established at the landscape level, to conduct the LandScale assessment. The input from multiple organizations was critical to making the assessment holistic and responsive to local and global challenges. The recognition of the relevance of the assessment results to drive sustainability at the landscape level prompted a coalition of stakeholders to collaborate, and agree with Agua Tica, to seek funding to carry out the next LandScale assessment of the landscape by 2025.

Despite some limitations in data availability and representativeness, this assessment provides critical insights on the state and trends of multiple dimensions of sustainability such as natural ecosystem conversion, ecosystem restoration, threats to species, water quantity and quality, land-use regulation, poverty, and crop productivity which are key to develop new incentives to achieve watershed integrated management.

Many assessments encounter data gaps that cannot feasibly be filled, especially during the initial assessment. Data gaps related to any indicators and metrics within the assessment scope are documented and justified in the full results (see appendices) by explaining the data identification, screening, and evaluation steps taken and how outcomes of those steps resulted in the data gap. For data that are determined to be of sufficient quality to use in the assessment, the outcomes of the data screening and quality evaluation processes, as well as any caveats or limitations identified through these processes, are also documented in the full results available in the appendices.

Citation

IUCN and Agua Tica/Fundecor. 2021. LandScale holistic initial assessment for San José Northern Subcatchments, Costa Rica.

Acknowledgments

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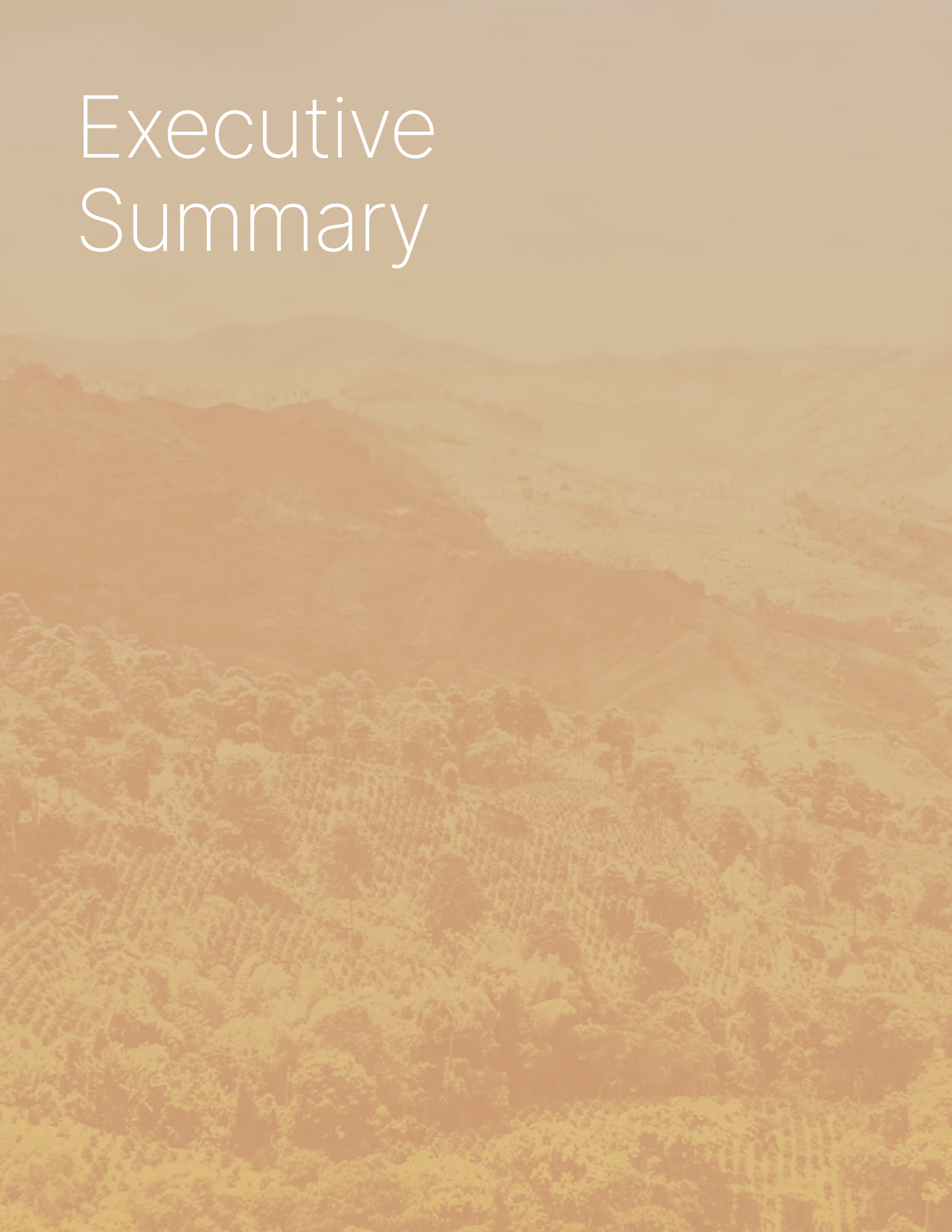
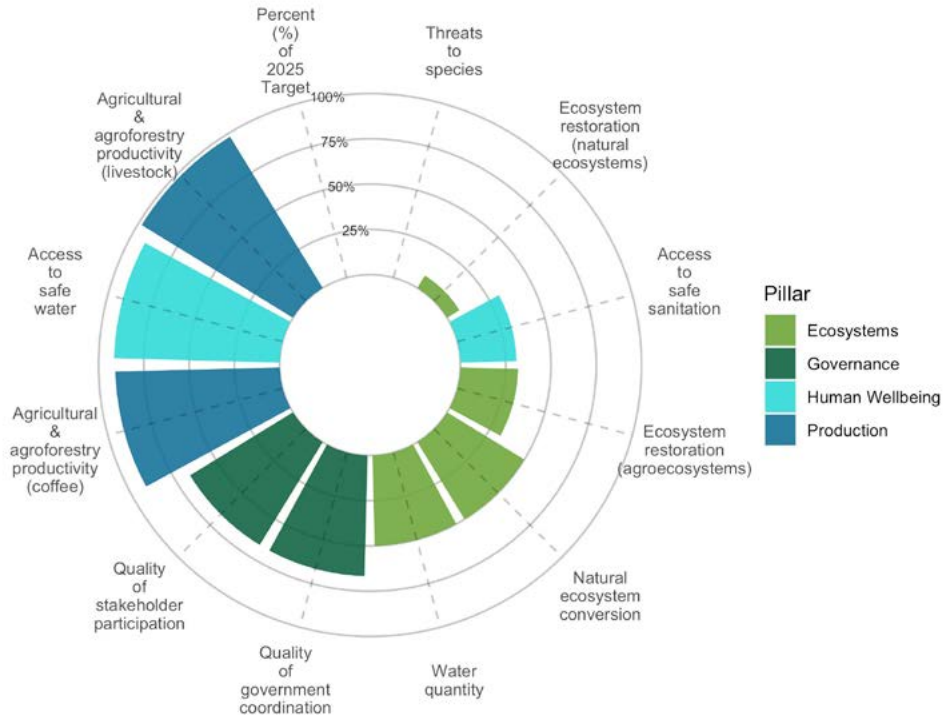
Executive Summary



The SJNS provides more than 60% of the water consumed in the San José metropolitan area. Improved water infiltration and quality in the landscape is critical to ensure reliable access to clean, affordable water for the inhabitants downstream in the Greater Metropolitan Area of San José, Costa Rica. The SJNS provides large volumes of high-quality coffee beans for export as well as milk for local populations. The baseline LandScale assessment highlights positive trends in natural ecosystem conservation and restoration (especially through agroforestry in coffee plantations) but finds negative trends in water quantity (dry season flow rates) and agricultural productivity. Although the results show that agricultural and agroforestry productivity indicators appear close to reaching 2025 targets, they will likely be the most difficult to achieve because of current downward trends. The initial assessment shows the need to invest in further protection and restoration of ecosystems in water recharge and protection zones; evidence suggests that improved management can mitigate the current downward trend of flow rates in the SJNS. Achieving integrated watershed management at scale will require implementing formally adopted and enforceable land-use plans and increasing the adoption of good agricultural practices and restoration through sectoral initiatives (Agua Tica, Livestock, and Coffee NAMAs). The initial assessment informed the development of a landscape-level action plan, and corresponding targets for 2025, to measure and credibly report impacts and contributions made by SJNS stakeholders in a subsequent LandScale assessment.

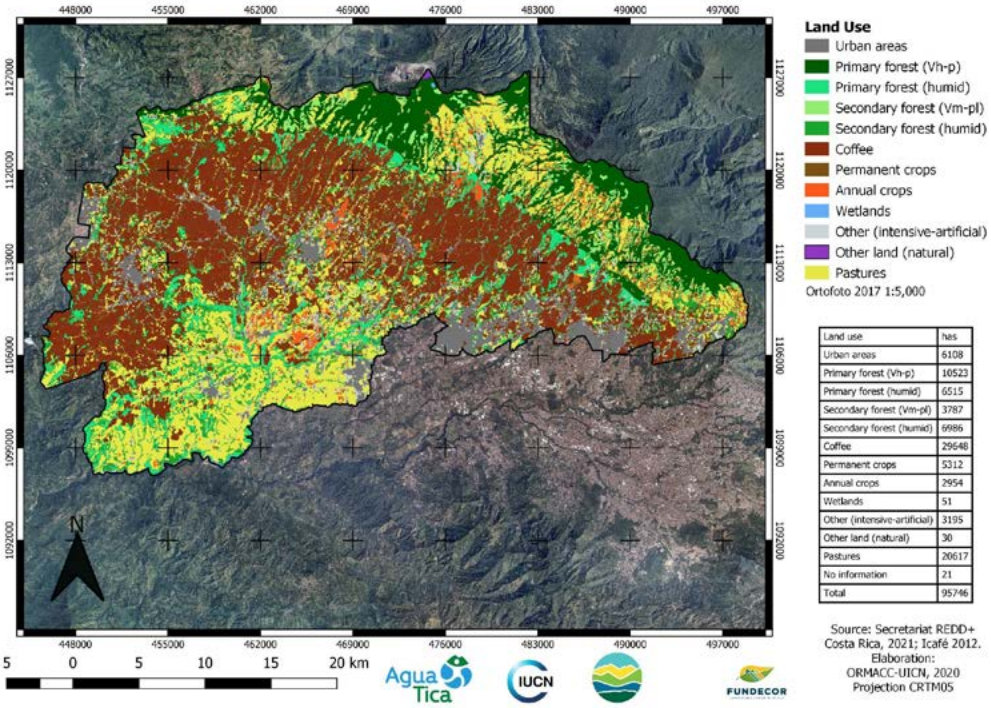
Percent progress toward 2025 target for key indicators as of SJNS initial assessment



The Landscape

The SJNS landscape is located within the central mountain range of Costa Rica and includes the northern region of the Great Metropolitan Area of the capital, San José, which is home to more than two million people and is the largest industrial area in Costa Rica. The landscape hydrology includes a dense network of rivers whose springs are located within the mountains which unite in the Grande de Tárcoles river that ultimately flows into the Pacific Ocean.

Map of land use/land cover of SJNS



Land use	has
Urban areas	6108
Primary forest (Vh-p)	10523
Primary forest (humid)	6515
Secondary forest (Vm-pl)	3787
Secondary forest (humid)	6986
Coffee	29648
Permanent crops	5312
Annual crops	2954
Wetlands	51
Other (intensive-artificial)	3195
Other land (natural)	30
Pastures	20617
No information	21
Total	95746

Source: Secretariat REDD+ Costa Rica, 2021; Icafé 2012.
Elaboration: ORMACC-UICN, 2020
Projection CRTM05

The capital's residents and industry depend on the SJNS as an essential source of water. Because of increased urbanization driven by the expansion of the Greater San José metropolitan area, fast and unregulated land-use changes within the SJNS are driving the conversion of coffee and pasture to houses and real estate properties. The combination of high population growth, poor urban planning, and land-use change has degraded water sources, transforming the basin into one of the most polluted in Central America, with the highest level of water stress in Costa Rica.[1,2]

The SJNS landscape has a high potential to achieve national restoration goals through silvopasture, coffee agroforestry, and natural forest regeneration. This is highlighted by the IUCN assessment of Forest Landscape Restoration[3] (FLR) activities, part of Costa Rica's decarbonization strategy[4] which includes reducing emissions through improved agricultural practices, rangeland and manure management, and maintaining and increasing forest cover. The SJNS landscape represents a unique opportunity to illustrate how Costa Rica can achieve its climate targets through nature based solutions and sustainable food systems.

1. Herrera Ocampo, F. (2018). *Monitoreo de ODS en Costa Rica : Estrés hídrico Disponibilidad de agua vs Extracción*. INEC. Available from: https://www.cepal.org/sites/default/files/presentations/presentacion-monitoreo-ods-costa-rica-estres-hidrico-disponibilidad-agua-versus-extraccion-inec.pdf.
2. MINAE-DA. (2013). *Plan nacional de monitoreo de la calidad de los cuerpos de agua superficiales - Costa Rica. San José*, Costa Rica: MINAE-Dirección de Agua. Available from: https://canjeporbosques.org/wp-content/uploads/2017/07/Plan-de-Monitoreo-de-Aguas-Superficiales.pdf.
3. Beatty et al, 2018 https://portals.iucn.org/library/node/47805
4. https://cambioclimatico.go.cr/plan-nacional-de-descarbonizacion/

29%

27,811 Hectares

Natural Ecosystems

Natural ecosystems cover 29% of the SJNS, and include two types of ecosystems: very wet rainforest (15%) and rainforest (14%). Forest is intact (tree cover > 84%) for 60% of forest ecosystems which are therefore classified as mature/primary forests.[5] Nearly 90% of primary forest is located within Protected Areas.

10%

9,303 Hectares

Communities

The total population living in the landscape is 625,367, 12% of the total population of Costa Rica. Thirty-five percent of the landscape population resides in rural areas, where key target groups that manage lands include coffee growers, cattle breeders[6] and forest owners (SINAC or private). Only 6.6% of the population are above 65 years old, while household size is intermediate (3.5 people/households). The migrant population, one of the primary sources of workforce for the coffee sector, represents 6.5% of the total population.[7] In general terms, people living in SJNS have access to the best living conditions of the country if compared with other regions.

61%

58,531 Hectares

Production

The agricultural sector is dominated by coffee (29,648 ha), although livestock (20,617 ha), and sugar cane (4,201 ha) are also produced. Coffee production systems are generally owned by smallholders (cultivating 3 to 5 ha)[8], while livestock breeders generally have larger farms, with an average of 15 ha.[9] Sugar cane producers generally farm 3 to 10 ha.[10] In all cases, private smallholders drive production with the exception of a small number of sugarcane and coffee companies.

5. MINAE, 2019, Technical annex of the republic of Costa Rica, https://redd.unfccc.int/submissions.html?country=cri
6. MAG/INEC. (2014). Cuadro 26 - Costa Rica: Total de fincas y extensión en hectáreas por tipo de uso de la tierra según provincia y cantón. San José Costa Rica. Available from: www.inec.go.cr/sites/default/files/documetos-biblioteca-virtual/recenagro2014-t1-26.xlsx.
7. INEC. (2011). Costa Rica: Indicadores de hogar según cantón y distrito. Instituto Nacional de Estadísticas. Available from: http://www.inec.go.cr/censos/censos-2011.
8. Icafé. (2019). Informe sobre la actividad cafetalera de Costa Rica. Heredia, Costa Rica. Available from: http://www.icafe.cr/wp-content/uploads/informacion_mercado/informes_actividad/actual/Informe%20Actividad%20Cafetalera.pdf.
9. MAG/INEC. (2014). See footnote 6
10. LAICA, 2018, Resultados de la zafra 2016/2017.

Landscape Partners & Stakeholders

The water fund, Agua Tica, was established in 2015 to protect water resources. This initiative unifies public and private actors such as water providers (AyA, ESPH, UNAGUAS), beverage companies (Coca FEMSA, FIFCO), regulation bodies (Water division), and local/international environmental NGOs (TNC, FUNDECOR, CRUSA). Agua Tica has identified high-impact areas for investment and has made positive gains towards watershed protection, including monitoring systems to evaluate their impact. Agua Tica aims to ensure that the actions of different programs, policies, and other initiatives in the landscape are working in tandem to drive ambitious change. Two nationally Appropriate Mitigation Actions (NAMA) are active in SJNS, promoting improved land management practices in the livestock and coffee sectors. For instance, the main milk cooperative (Dos Pinos) provides technical assistance and facilitates financing of good agricultural practices within its farmers' network. Likewise, coffee farmers can receive Payment for Environmental Services (PES) from either public programs (FONAFIFO)[11] or from their buyers, such as Nespresso which supports tree planting through its carbon insetting global program.[12]

11. https://www.fonafifo.go.cr/es/servicios/actividades-y-sub-actividades/
12. https://www.sustainability.nespresso.com/climate-resilience-through-agroforestry

Findings & Key Performance Indicators

The baseline assessment in SJNS covered 31 out of 36 indicators in version 0.2 of the LandScale assessment framework. No custom indicators were introduced. Indicators were selected in a participatory manner, based on stakeholders needs in monitoring and evaluation, existing impacts, concerns, trends and drivers.

Ecosystems

Conserve and restore natural ecosystems

Effective conservation and protection of natural ecosystems	✓
Natural ecosystem conversion	✓
Natural ecosystem degradation	✓
Ecosystem restoration	✓
Natural ecosystem connectivity	✓

Protect and restore biodiversity

Threats to species	✓
Biodiversity habitat conversion	✓
Biodiversity habitat degradation	✓
Biodiversity habitat restoration	○
Biodiversity habitat protection	✓

Maintain and enhance ecosystem services

Water quantity	✓
Water quality	✓
Agriculture, forestry, and other land land use (AFOLU) sector GHG sources and sinks	✓
Other Ecosystem Services	✓

Governance

Recognize and protect rights to land and resources, and reduce related conflicts

Land tenure	✓
Land conflicts	✓
Resources tenure	○

Promote transparency, participation, inclusion, and coordination in land use policy, planning, and management

Land use plan adoption and enforcement	✓
Coordination of government agencies in land-use policy, planning, and management	✓
Stakeholder participation and inclusion in land-use policy, planning, and management	✓
Illegality and corruption related to land and resources	✓
Climate change vulnerability and adaptation	○

○ Required ○ Optional ✓ Completed

Human Well-being

Improve standard of living, especially for vulnerable and marginalized groups

Household income and assets	✓
Health and nutrition	✓
Education	✓
Water, sanitation, and hygiene	✓
Basic infrastructure	✓
Vulnerability	✓

Respect, protect, and fulfill human rights

Child labor	✓
Forced labor	○
Worker's rights	○
Other Human Rights	○

Production

Promote regenerative agricultural, agroforestry, and tree production systems

Agricultural, agroforestry, and tree plantation productivity	✓
Input use efficiency in aricultural, agroforestry, and tree production systems	✓
Adoption of sustainable land management practices	✓
Adoption of sustainable waste management practices	✓

○ Required ○ Optional ✓ Completed

Table shows version 1 of the assessment framework. This report used version 0.2 of the framework. Therefore, some indicators mentioned in the text may not align completely with all indicators in the table. View full results to see the complete version 0.2 framework.

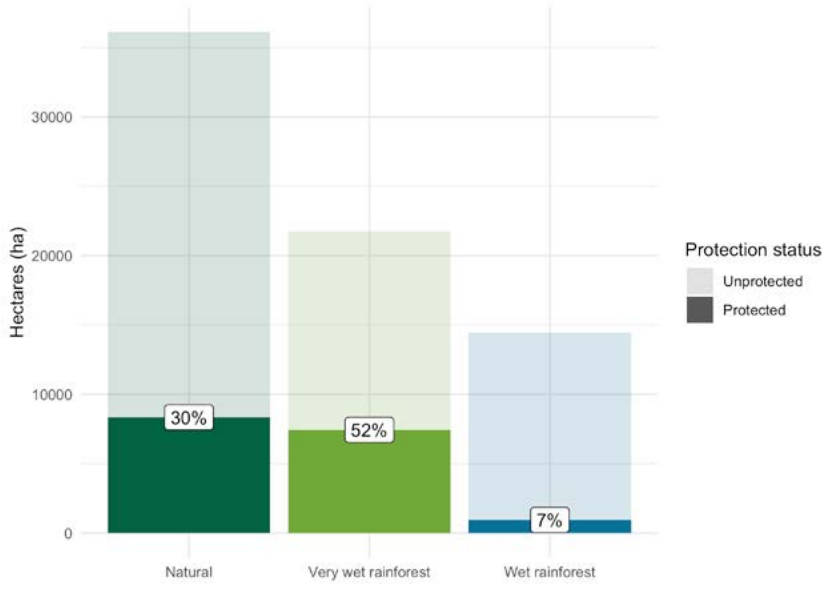
A key insight from the LandScale assessment is that the lack of land use planning influences natural ecosystem protection, restoration, and trends in water quantity in the SJNS landscape. The loss of natural ecosystems is mainly due to urban expansion and to a lesser extent, expansion of annual crops (Indicator 1.1.2 Natural ecosystem conversion). For this reason, payment for environmental services (Indicator 1.1.1. Natural ecosystem protection) primarily target forest areas within jurisdictions without land-use plans in order to protect natural ecosystems from human activities in aquifer recharge areas (Indicator 1.1.2). Indeed, only 39% of the landscape has a land-use plan formally adopted and enforceable while for the rest, zoning plans are under development and therefore not enforceable (Indicator 3.2.1 Land-use plan adoption & enforcement). Further demonstrating the importance of enforceable land-use plans, the expansion of housing and urban areas are the top threats to biodiversity at the landscape level, followed by the conversion and degradation of natural habitats due to livestock farming and ranching (12% and 10% of the landscape potential to reduce threats to species, respectively). Improving land use planning will generate stronger and extended protection of natural ecosystems and areas of water bodies.

Urban expansion and loss of natural ecosystems are also likely drivers of downward trends in volume of spring and superficial water sources in the SJNS, despite an increase in rainfall. However, evidence from a restoration project in the Naranjo canton[13] suggests that ecosystem restoration can mitigate the historical reduction in water flows by up to 50% during the dry season compared with water sources without restoration measures. This highlights the potential for restoration to act as an effective measure to lower the risk of water scarcity, making more resilient water supply infrastructure investment at the community leve. Currently about 8% of households are without access to safe drinking water (Indicator 2.1.4. Water, sanitation & hygiene), the water shortages during the dry season can impact adequate supply particularly in the Alajuela, Atenas and Heredia cantons.

Indicator: Protection of Natural Ecosystems

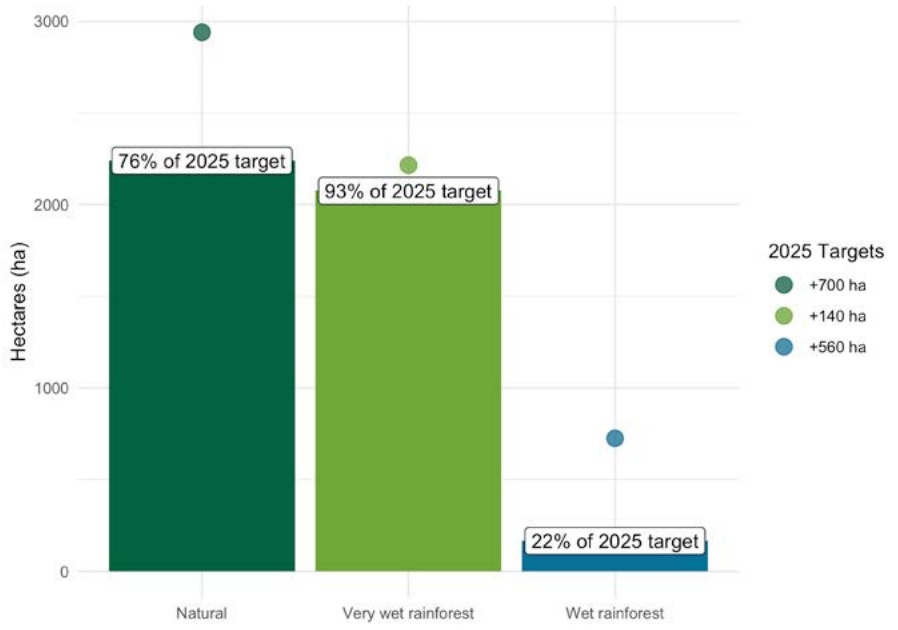
At the landscape level, 8,925ha (30%) of natural ecosystems are under protection. The primary goal for SJNS is to improve the protection of natural ecosystems located in strategic areas for the protection of its water resources. The target is to bring 700 ha of natural ecosystems located in water recharge or riparian areas under conservation through payment for ecosystem services (PES) by 2025 (see figure). Current ecosystem protection through PES and other protected land designations are not mutually exclusive (shown separately in Figures 1 and 2), and increases in PES will primarily target natural ecosystems not already under protection.

Fig 1. Indicator 1.1.2: Baseline total area (ha) and percentage (%) of natural ecosystem types under protection



13. In the Naranjo canton, the comparison of water gauges of several water sources where restoration of natural ecosystems (regeneration) occurred with other water sources provided empirical evidence of positive impacts in mitigating drought.

Fig 2. Natural ecosystem protection through PES

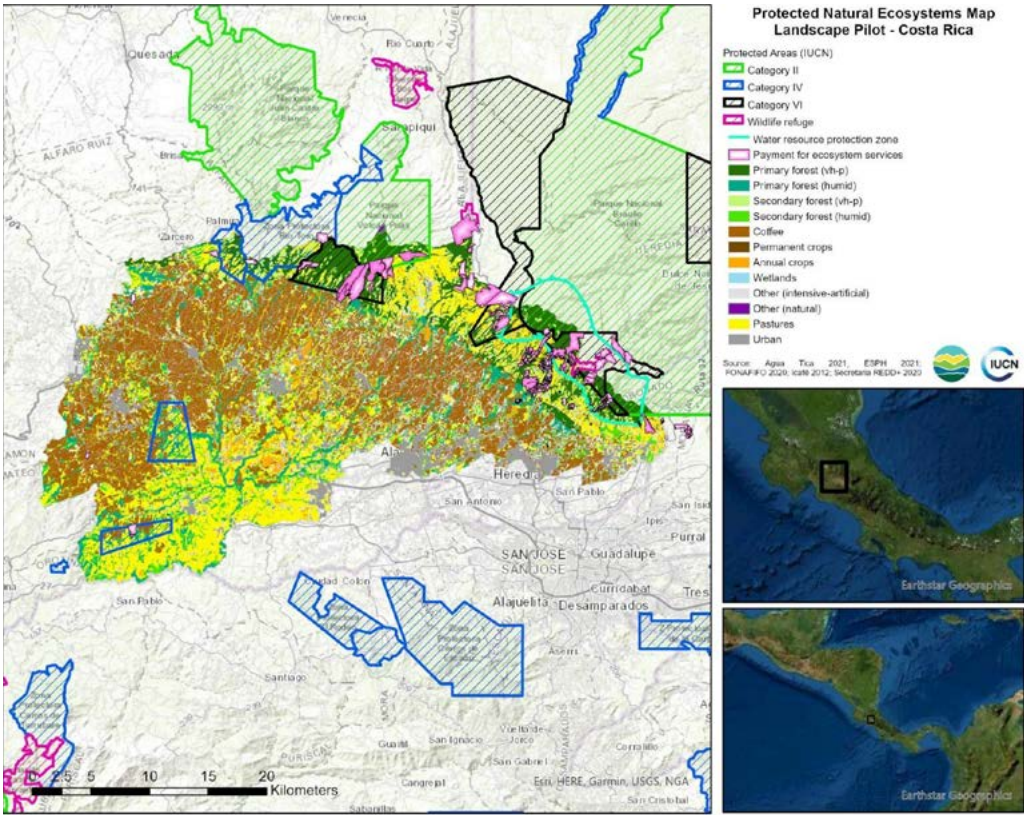


Considering the extent of protected areas, their corresponding management categories, 11,005 ha, or 11% of the landscape area is managed for long term protection, where 2,435 ha are protected as a National Park (II)[14], 4,122 ha as Habitat/Species Management Area (IV) and 4,400 ha as protected areas with sustainable use of natural resources (VI).

As the map shown in Figure 3 illustrates, conservation efforts are not limited to legally recognized protected areas. PES for forest conservation (2796 ha in total or 10%) also plays a critical role in consolidating protected areas, especially those where productive activities are allowed. It is important to note that most water sources are generally located within or depend upon wet rainforest for their recharge. Existing protection through PES is concentrated only in very wet rainforests located in the highest parts of the watershed, leaving most of the wet rainforest unprotected (Figure 1). The findings from the baseline assessment indicate that landscape goals for the natural ecosystem show that our target of conserving 700 ha of forests through PES by 2025 are realistic. These additional conservation efforts should target unprotected wet rainforest fragments that remain in riparian areas, with the goal that 80% of the newly protected forests[15] are wet rainforests (see map of Agua Tica priority areas). The baseline results and the current focus on protection of wet rainforest, the landscape goals for natural ecosystem protection appear to be realistic.

15. Through either PES and/or oficial delimitation in cadastre or land use plans.

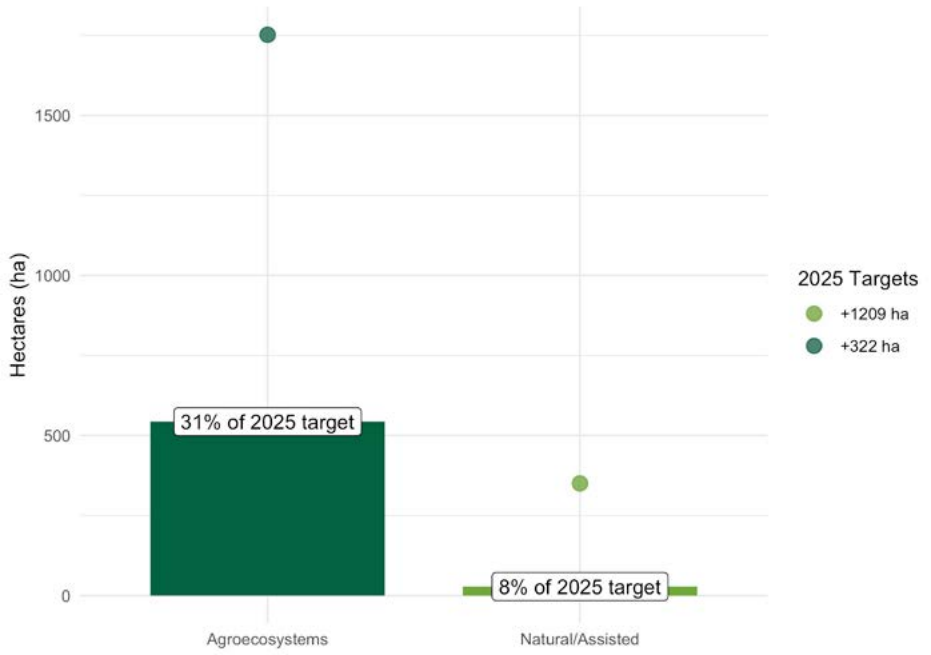
Fig 3. Protected natural ecosystems in the SJNS landscape



Indicator: Restoration of Ecosystems

The goal for ecosystem restoration in SJNS is to scale up improved ecosystem management practices in line with the coffee, livestock, and water sectors' goals. As part of this goal, the target is to bring an additional 1500 ha of natural ecosystems and agroecosystems under restoration by 2025 (+160% increase) in order to protect water resources and conserve/maintain crop productivity. According to multiple initiatives investing in restoration (Coffee NAMA, FONAFIFO PES, water providers, coffee producers/buyers), 570 ha have been brought under restoration since 2015 (Figure 4). The area was brought under restoration from which 543 ha referred to restoration of degraded agroecosystems through agroforestry, and 28 ha natural/assisted regeneration of wet and very wet rainforest. This represents 31% and 8% of the action plan target for degraded agroecosystems and natural ecosystem restoration by 2025 respectively. As such, restoration targets are on track for productive ecosystems, provided the sectorial efforts, such as carbon project expansion and simplified calls for PES in agricultural lands continue. Much larger investments are needed to reach landscape goals for natural ecosystem restoration.

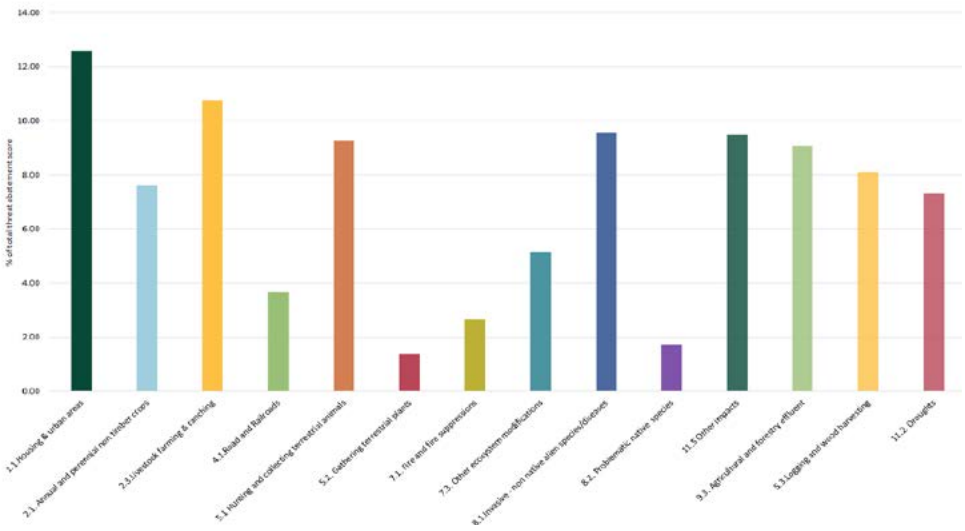
Fig 4. Natural and agro-ecosystem restoration baseline and targets for 2025



Indicator: Threats to Species

The application of the Species Threat Abatement and Restoration Metric (STAR) allowed screening for opportunities to invest in the most impactful conservation actions. After downloading the STAR potential (estimated) through the Integrated Biodiversity Assessment Tool (IBAT), a consultation to local experts was held to adjust STAR output to site-specific information in order to derive Potential STAR (calibrated).[16] Based on this "ground-truthed" version of potential STAR, mitigation planning was made possible thanks to other results obtained from LandScale assessment: indeed most of the main threats found at landscape level have corresponding indicators under LS which enable to translate initial results and targets for a given indicator (i.e. loss of natural ecosystems) in tangible, quantifiable and comparable biodiversity conservation benefits (STAR units). Expansion of housing and urban areas resulting in loss and degradation of natural ecosystems is the top threat prevailing at landscape level (12% of potential STAR) followed by the conversion and degradation of natural habitats due to livestock farming and ranching (10% of potential STAR). Invasive non-native alien species/diseases are especially problematic in SJNS (9.5% of potential STAR): indeed Chytrid fungus (Batrachochytrium dendrobatidis) affects many threatened species of amphibians that are endemic to the landscape. Despite there is no abatement action identified yet to tackle this specific disease, reducing other stressors such as collection, habitat degradation, would help mitigate this threat (Scheele et al. 2014).[17] As a result, the achievement of targets set for 2025 as part of SJNS action plan for watershed-integrated management would allow achieving 25% of San José Northern Subcatchments Threat abatement potential, or 235 STAR units. Much of this potential would be achieved through reducing degradation and loss of natural ecosystems.

Fig 5. Breakdown of STAR threat abatement scores within SJNS by threat type



16. See more details on STAR industry briefing note here.
17. Scheele, B.C., Hunter, D.A., Grogan, L.F., Berger, L., Kolby, J.E., Mcfadden, M.S., Marantelli, G., Skerratt, L.F. and Driscoll, D.A. (2014). Interventions for Reducing Extinction Risk in Chytridiomycosis-Threatened Amphibians: Reducing Extinction Risk in Amphibians. *Conservation Biology*, 28(5), pp.1195–1205.

Indicator: Water Quantity

The SJNS landscape is located in the most water stressed region of Costa Rica, where drought increasingly drives water shortages. Consequently, the general goal for the landscape is to improve water availability during the dry season. The specific target under the action plan is to halve the downward trend observed in the flow rates of the Rio Grande (Figure 7). Within the SJNS landscape, spring and superficial water sources flow downstream into the Rio Grande, the largest body of water in the landscape. For this reason, flow rates in the Rio Grande are the best available indicator for dry season water availability. Despite increases in local precipitation (Figure 8), dry season flow rates have declined by nearly 17% in the Rio Grande, and have declined for 90% of the 40 spring and superficial water sources upstream from the Rio Grande for which water gauge data could be obtained (Figure 6; 9). Reduced flow rates may be caused by increased water extraction, higher temperatures and/or land-use change (loss of natural ecosystems, soil sealing). However, evidence from the Naranjo canton (within the SJNS) suggests that restoration in water protection/recharge areas can halve the overall reduction in water quantity. This indicates that if appropriate measures are taken to protect water sources, current downward trends in water quantity can be mitigated.

Fig 6. Trends in seasonal flow rates of spring water and superficial water sources

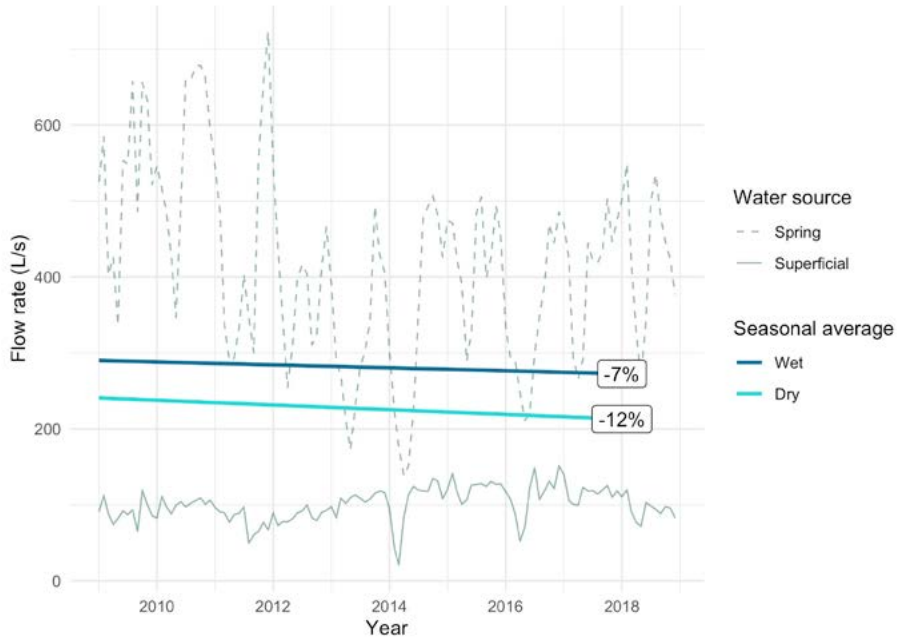


Fig 7. Trends in seasonal flow rates of the Rio Grande

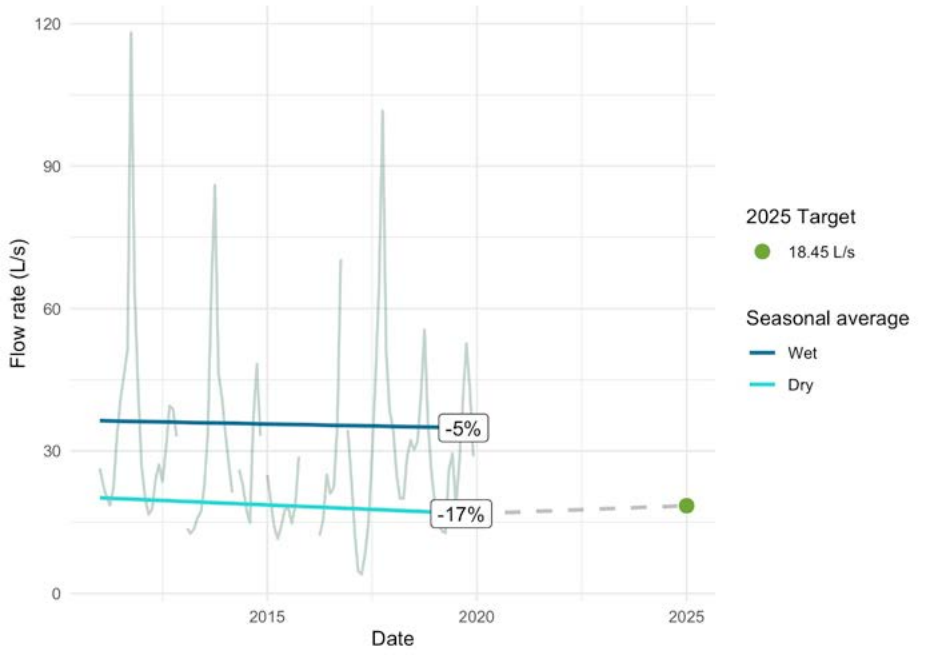


Fig 8. Local and global trends in seasonal precipitation

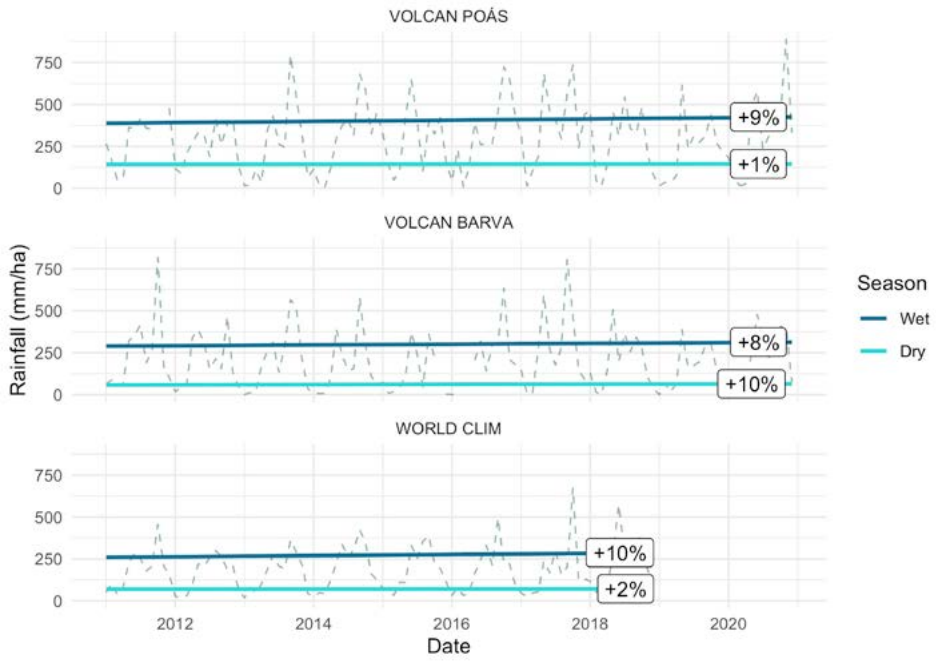
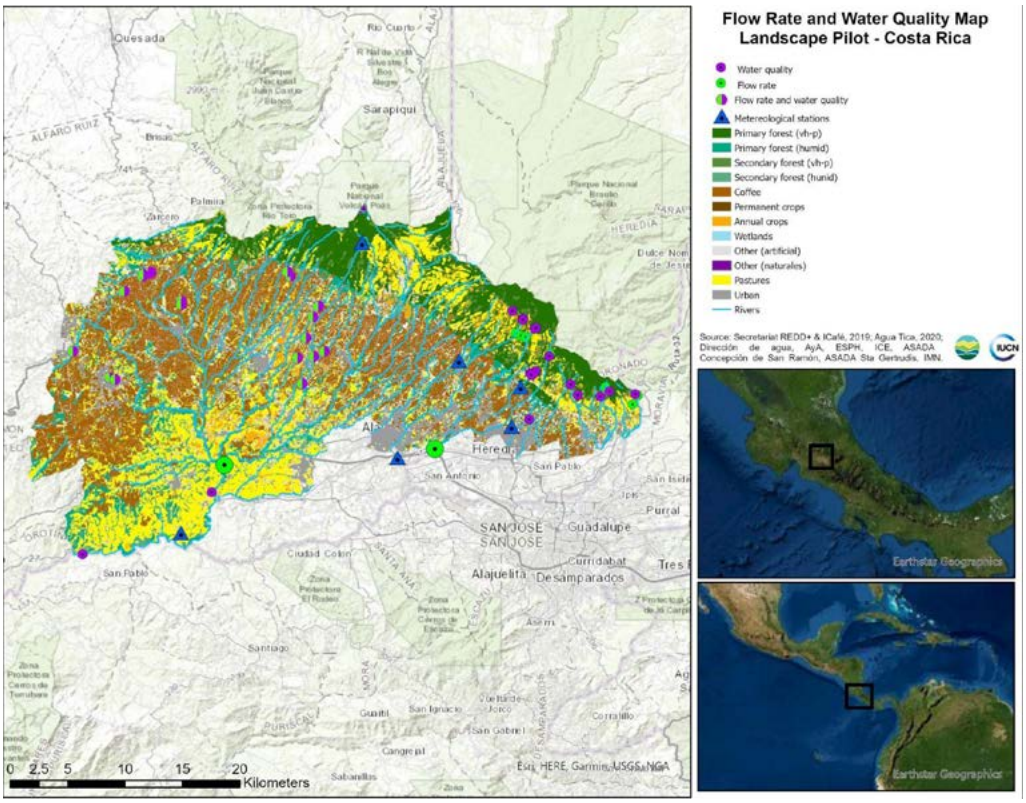


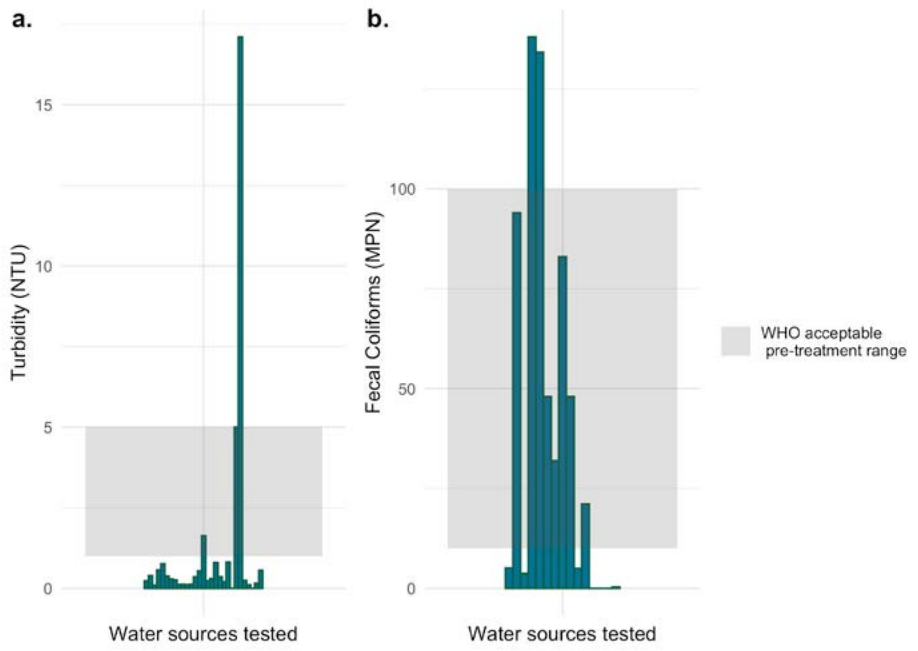
Fig 9. Flow rate and water quality in the SJNS landscape



Indicator: Water Quality

A goal for SJNS landscape water suppliers is to improve water quality to minimize treatment costs. A specific target for 2025 is that all water sources comply with the regulatory threshold for turbidity prior to treatment. Turbidity (reported in Nephelometric Turbidity Units, NTU) is a measure of sedimentation that represents a significant cost for water-treatment plants. During severe climate events, sedimentation may even obstruct water intake causing service shut-downs. Although regular sampling shows that water sources upstream of the Rio Grande generally comply with accepted NTU thresholds for drinking water (Figure 10), reductions in turbidity will nevertheless reduce costs for water providers. Likewise, contents in fecal coliform water sources remain within the range naturally found in water bodies, with occasional higher concentrations (Figure 10) that affect treatment costs. Restoration of riparian and water-recharge zones can significantly reduce turbidity, and improved monitoring through LandScale can help organizations report the impacts of restoration and conservation on water treatment costs. Additionally, improved monitoring may help water providers and strategic partners such as Agua Tica better quantify improvements and justify additional water tariffs to reflect the costs of protecting water resources.

Fig 10. Watershed contaminants[18]

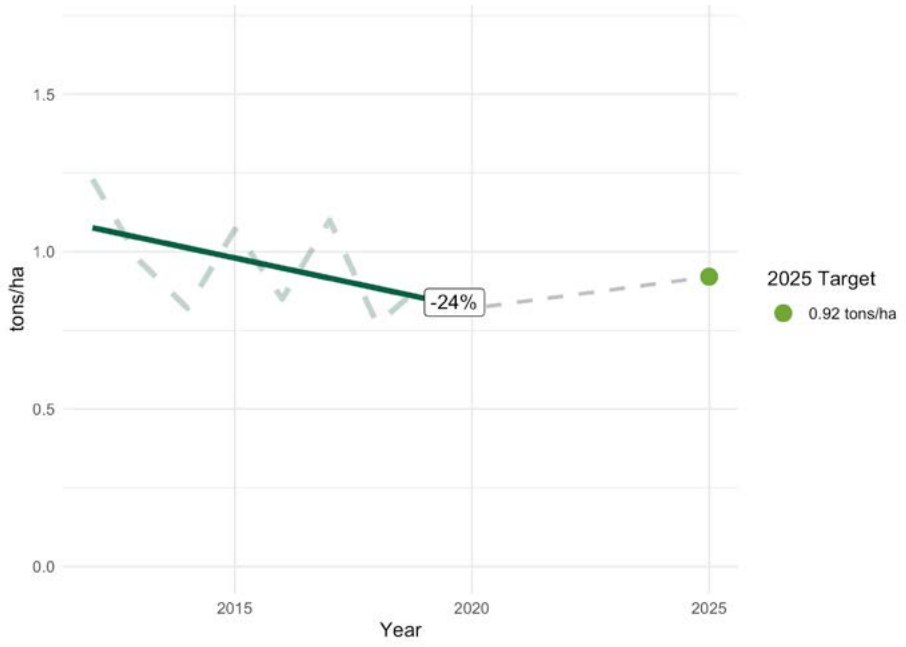


18. Values represent flow-weighted averages

Indicator: Productivity

Based on national goals[19] SJNS coffee producers aim to boost crop productivity by 10% by 2025. Average production levels of sugarcane and coffee plantations are 6.7 tons of sugar/ha and 0.91 ton of green coffee per ha.[20] While sugarcane yields remained stable over the last 5 years and are comparable with national and global averages, coffee yields have decreased by 24% from 2012 to 2020 (Figure 11) and are significantly lower than both national and global averages. Experts suggest declining productivity is multifactorial, due to ageing coffee plants, lack of management, prolonged heat, drought, and excess of rain favoring plague outbreaks (e.g. coffee rust).[21] Considering this trend, the target of improving coffee yields by 10% by 2025 seems not only realistic but also the minimum for the current 15,000 coffee growers to stay in business. Current low coffee prices[22] compared with labor costs, decreased yields only narrowly allow farmers to barely cover production costs, leaving only 4% of income generated by coffee sales as a net profit.[23]

Fig 11. Coffee productivity[24]



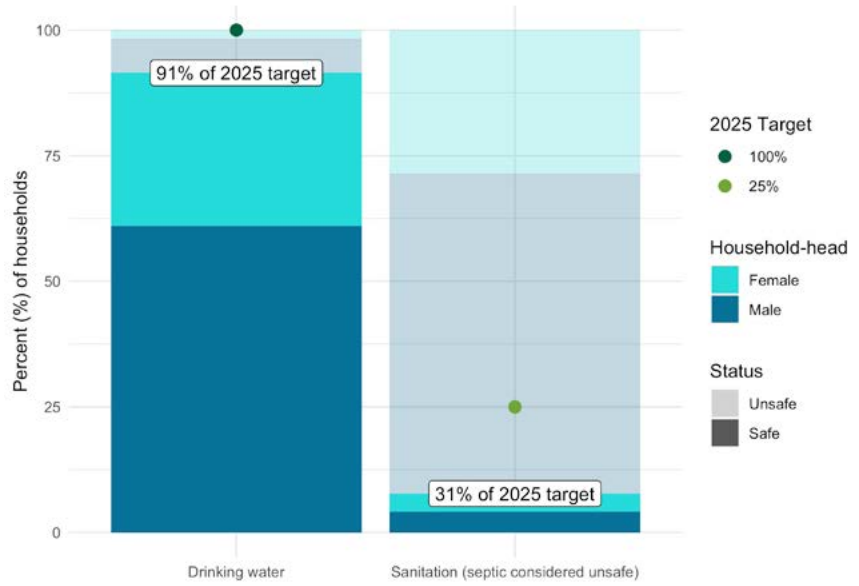
19. Icafé, 2020, Política Nacional cafetalera (propuesta), http://www.icafe.cr/icafe/gobierno-corporativo/plan-operativo-anual/
20. LAICA, CONEXION, resultados de la zafra 2016/2017, 2018, and Icafé, Anexo nacional 2020.
21. Icafé, 2020. Informe sobre la actividad cafetalera de Costa Rica, Noviembre 2020, Instituto del Café de Costa Rica. http://www.icafe.cr/sector-cafetalero/informacion-de-mercado/informes-de-la-actividad-cafetalera/
22. Icafé, 2020. Anexos nacional, Noviembre 2020, Instituto del Café de Costa Rica. http://www.icafe.cr/sector-cafetalero/informacion-de-mercado/informes-de-la-actividad-cafetalera/
23. Icafé, 2020, Política Nacional cafetalera (propuesta), http://www.icafe.cr/icafe/gobierno-corporativo/plan-operativo-anual/
24. Percent change was calculated using the first and last two years of data in order to encompass the biennial cycle of coffee productivity

Indicator: Access to Safe Water or Sanitation

SJNS is home to the most contaminated river of Central America, which is why, in accordance with SDG 6.2 country approach,[25] it is one of the priority regions for improving coverage of water treatment. The target for SJNS is that 25% of households have access to a safely managed sanitation facility by 2025. This target is based on national and regional goals to provide access to safe sanitation to 100% of households by progressively substituting on septic tanks with sewage treatment systems by 2045.[26]

In SJNS, 9% of households access water for household use through wells, rivers, creeks or rain catchments which are considered unsafe (7% and 2% men and women led households respectively). In regards to sanitation, 2% of households lack a safely managed sanitation facility (hole, cesspool, latrine or none assuming septic tanks are considered a safely managed sanitation facility), where 1% and 0.7% are men and women led households respectively.[27] Evidence suggests most septic tanks are not regularly pumped and only serve for treatment of bathroom wastewater, while greywater is directly discharged to water bodies.[28] As septic tanks are not considered a safely managed sanitation facility, 93% of households living in the landscape lack access to a safely managed sanitation facility. To achieve the landscape target, substantial investments are needed to increase safely managed sanitation from 7% to 25% by 2025 (Figure 12). At the landscape level, efforts should focus on densely populated areas and infrastructures located close to water sources.

Fig 12. Baseline and 2025 targets for access to drinking water and sanitation



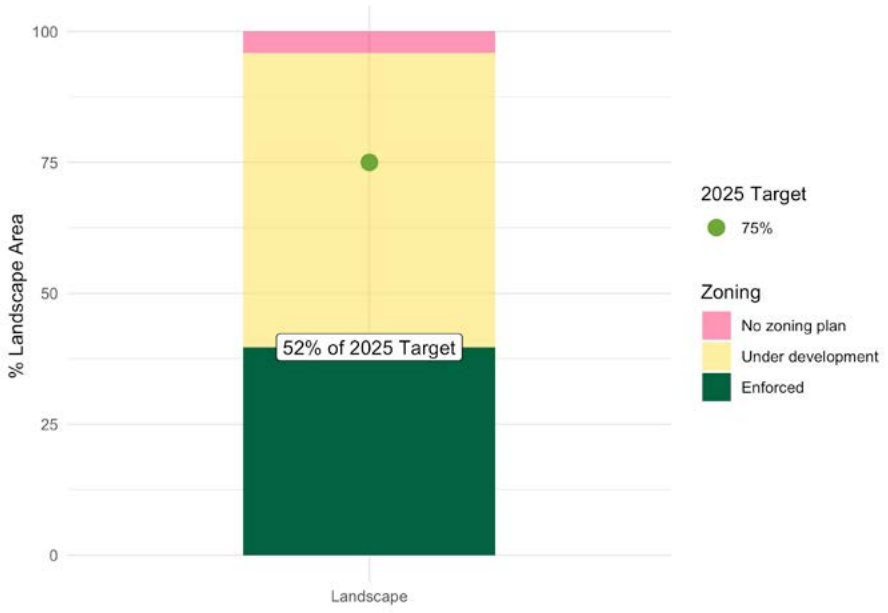
25. Costa Rica. Ministerio de Planificación Nacional y Política Económica. Área de Análisis Desarrollo. Unidad de Prospectiva y Política Pública Costa Rica. Agua y saneamiento 2030, análisis relacionado con los ODS / MIDEPLAN. 2018.
26. AyA, MINAE y MS, "Política Nacional de Saneamiento en Agua Residuales 2016-2045", 2016, p80
27. INEC, 2020, Encuesta nacional de hogares 2019.
28. Soto-Córdoba, S.M., Gaviria-Montoya, L. and Pino-Gomez, M. (2019). ESTUDIO DE CASO: DISPOSICIÓN DE LAS AGUAS RESIDUALES DOMÉSTICXAS EN ZONAS RURALES DE COSTA RICA1. *Ambiente & Sociedade* [online], 22. Available from: http://www.scielo.br/j/asoc/a/ZWyrxmRTrLJtzRZPdQT9bTK/?lang=es [accessed 5 July 2021].

Indicator: Governance - Land-Use Zoning/Plan

The goal for the SJNS landscape is to make land-use zoning plans fully enforceable and account for environmental impacts. The target is to increase the area with a land-use plan that is formally adopted and enforceable to 75% by 2025. The lack of land use planning in Costa Rica emanates from the contrast between urban and environmental legislation.[29] Urban planning laws from 1968 take precedence over environmental legislation which would require land use plans to incorporate environmental criteria (2006). In practice, that means land use plans are unenforceable and often do not include necessary environmental impact and vulnerability assessments. Today only 40% of the landscape has a land use plan formally adopted and enforceable, 56% is under development and therefore not entirely enforceable, and 4% has no zoning plan.

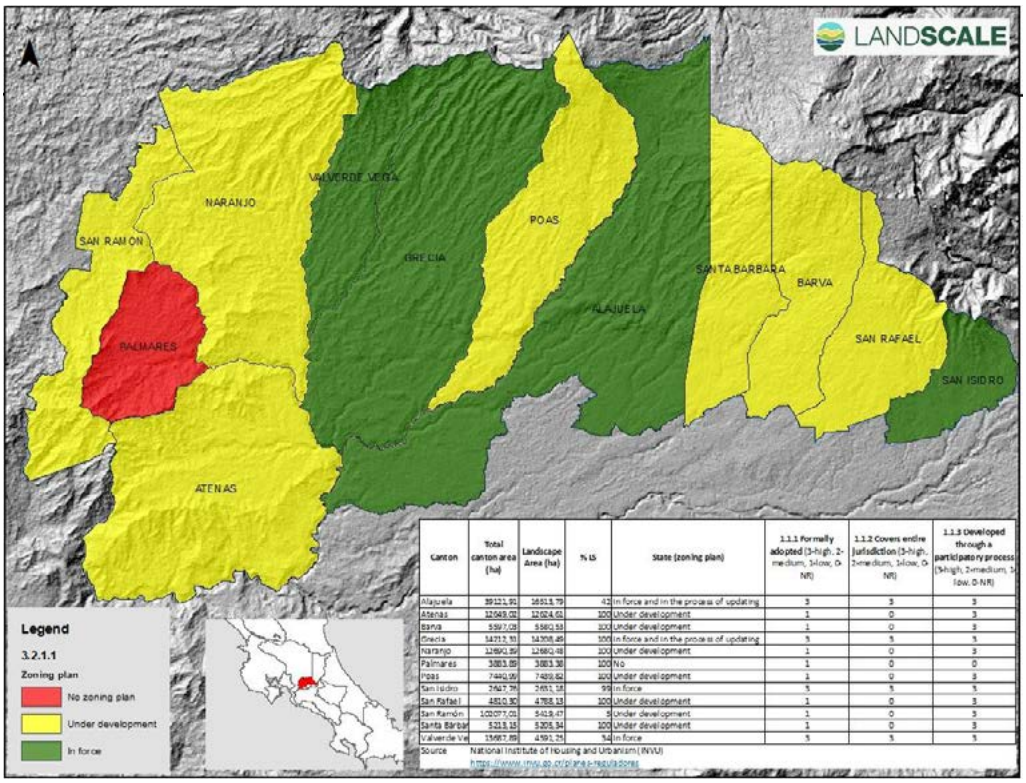
The goal for the landscape is to make land-use zoning plans increasingly inclusive of environmental aspects in order to be fully enforceable. The target is to increase the area with a land use plan that is formally adopted and enforceable to 75% by 2025. Based on the baseline assessment results, adoption of land-use and zoning plans should increase by 30% across the jurisdictions by the next LandScale Assessment (2025) (Figure 13). This will require the cooperation of local governing bodies from multiple cantons shown in Figure 14 in yellow.

Fig 13. Landscape area under enforceable zoning plans



29. Astorga. A., 2018. Informe estado de la nación en desarrollo humano sostenible. Ordenamiento ambiental del territorio: situación y perspectivas en Costa Rica.

Fig 14. Canton zoning plans in the SJNS landscape



Canton	Total canton area (ha)	Landscape Area (ha)	% LS	State (zoning plan)	1.1.1 Formally adopted (3-high, 2-medium, 1-low, 0-NR)	1.1.2 Covers entire jurisdiction (3-high, 2-medium, 1-low, 0-NR)	1.1.3 Developed through a participatory process (3-high, 2-medium, 1-low, 0-NR)
Alajuela	38121,91	1651,79	4	In force and in the process of updating	3	3	3
Atenas	12049,01	12024,61	100	Under development	1	0	3
Barva	5597,03	5580,53	100	Under development	1	0	3
Grecia	14717,33	14398,49	100	In force and in the process of updating	3	3	3
Naranjo	12690,89	12680,48	100	Under development	1	0	3
Palmares	3883,89	3883,38	100	No	1	0	0
Poas	7440,99	7439,62	100	Under development	1	0	3
San Isidro	7427,79	7451,18	99	In force	3	3	3
San Rafael	4810,30	4788,13	100	Under development	1	0	3
San Ramón	10007,01	5419,47	5	Under development	1	0	3
Santa Bárbar	5213,15	5205,34	100	Under development	1	0	3
Valverde Ve	15687,89	4593,25	94	In force	3	3	3

Source National Institute of Housing and Urbanism (INVU)
https://www.invu.go.cr/planes-reguladores

Conclusion

The initial assessment of SJNS showed that with regards to loss of natural ecosystems, the main driver of deforestation is urban expansion, where 60% of lost natural ecosystems were converted to areas maintained as artificial bare soils for parking lots, for example. In order to reach the landscape targets, the loss of natural ecosystems should be halved (from 180 to 90 ha/year) by 2025. This appears achievable provided local governments currently developing their land-use plans succeed in formally adopting and enforcing those plans. This is only one of the multiple uses the Commission for Integrated Management of Tarcoles Watershed would make of these results. The initial assessment will also help populate their own watershed level monitoring system, especially on GHG emissions and carbon sequestration, ecosystem connectivity, and water quality to inform the action of their members (local governments).

The assessment confirms multiple initiatives are investing in ecosystem restoration and protection of natural ecosystems at the landscape level. These accumulated efforts put the landscape on its way to reach restoration and protection targets. The initial assessment also helped build a vision for integrated watershed management, orienting restoration and conservation efforts to priority areas[30] at the landscape level. Information collected through the baseline assessment identifies opportunities for cross-sector collaboration and setting credible targets for 2025. The landscape intends to focus on activities for three sectors — coffee, livestock, and drinking water — that are crucial to reaching the sustainability objectives of the landscape.

In addition, the baseline assessment highlights the expansion of agroforestry practices that would yield greater impacts for water recharge and biodiversity[31] focusing on eastern jurisdictions of SJNS which is a biodiversity-rich area, with less investment in restoration. This finding orientates companies and initiatives engaged in planting for climate change mitigation to expand activities in those locations expected to yield greater water and biodiversity benefits.

Another use of the baseline assessment results is that municipalities and community-based water providers dispose of the necessary data to establish and monitor new water tariffs. Throughout the application of LandScale in SNJS, IUCN and Agua Tica supported 4 water community-based water providers and two municipalities in their effort to establish water tariffs, thus developing a blueprint to develop local water tariffs ready for replication at the landscape level. Additionally, local governments are now able to access recent, simplified, regularly updated, and precise maps of natural ecosystem loss to determine whether those are in line with local land-use plans, which might facilitate stronger regulation of land-use changes.

The next assessment is scheduled for 2023 to support SJNS stakeholders such as coffee buyers, the ministry of agriculture, and local governments in planning activities, reporting impacts, and measuring progress against targets. For instance, water providers could use LandScale results to demonstrate the impacts of water tariffs to the control body (ARESEP), while coffee companies involved in local carbon projects could report their positive impact on biodiversity in line with the Convention for Biological Diversity.

30. Where investments would be most cost-effective.
31. This would indeed restore habitat of threatened species (e.g., the endemic bird Costa Rican ground-sparrow

Appendices

- Full Results
- Sustainable Landscape Partnership/Stakeholders
- Adjacency Analysis
- Landscape Situational Analysis
- Indicator and Metric Selection
- Data Evaluation
- Local Review Summary

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