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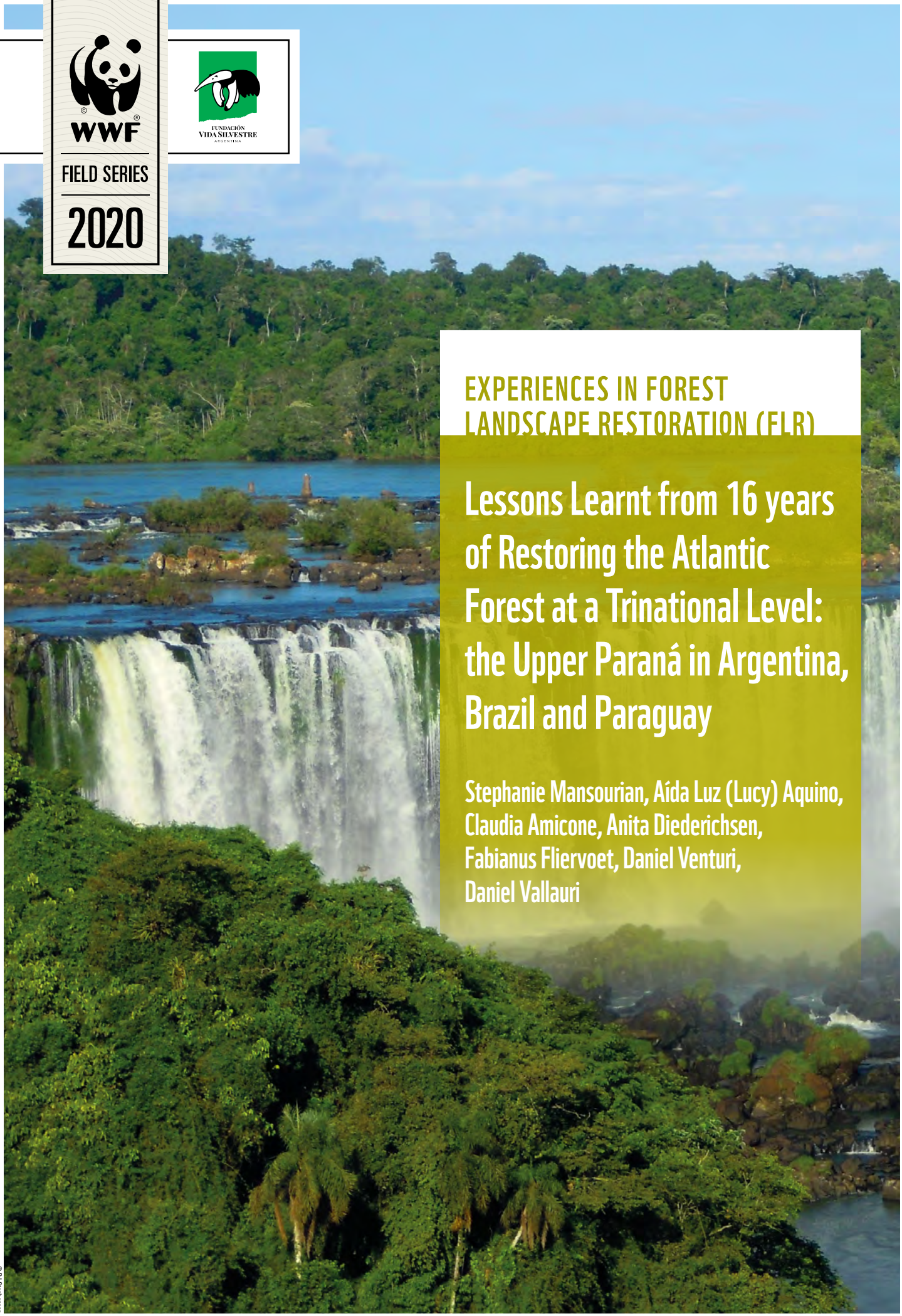

EXPERIENCES IN FOREST LANDSCAPE RESTORATION (FLR)

Lessons Learnt from 16 years of Restoring the Atlantic Forest at a Trinational Level: the Upper Paraná in Argentina, Brazil and Paraguay

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WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global Network active in more than 100 countries.

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by: conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

Fundación Vida Silvestre Argentina is an independent non-governmental organization that was created in 1977 in Argentina. Its mission is to promote solutions for environmental conservation, sustainable use of natural resources and responsible behaviour in the context of climate change.

Since 1988 Vida Silvestre has been associated and has represented WWF in Argentina.

PREFACE

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Situated where Brazil, Argentina and Paraguay meet, the Upper Paraná Atlantic Forest Ecoregion represents a fragile ecosystem. The Atlantic Forest has been identified as one of the world's most endangered forests. It is a diverse forest teeming with irreplaceable species, including several species of tamarins and the majestic jaguar.

Because of its strategic location, the Upper Paraná has seen its forest dwindle and degrade. Today, less than 8% remains, much of it in a degraded state. The forests have been logged for their timber, and have been converted to cities, to plantations and to livestock pastures. Although these pressures continue, we believe that through forest landscape restoration, some of the damage can be reversed; we firmly believe that this must be reversed.

DAMAGE MUST BE REVERSED IN THE UPPER PARANA ECOREGION.

Much more than the forest is at stake. As we lose this unique forest, we lose species that hold the key to new medicines, to foods, to raw products; we lose the services that this forest provides in terms of water, carbon, recreation and nutrient cycling. As we lose this natural capital it is our economy that will suffer, our farmers, our cultures, our indigenous communities. For all these reasons and many more, our teams at WWF and Fundación Vida Silvestre Argentina have collaborated with literally hundreds of stakeholders in the last 16 years to conserve and restore this vital forest.

Working across three countries presents its challenges, and we have had our fair share. However, with urgency comes a renewed sense of purpose, duty and partnership. We are proud to be partners in restoration initiatives such as the Bonn Challenge, the Initiative 20x20, the Atlantic Forest Restoration Pact and now the Trinational Initiative to ensure that the Atlantic Forest can be successfully restored. This publication is intended to share the lessons we have learnt so far in the hope that they can provide a good basis for further restoration work in the Upper Paraná, in the wider Atlantic Forest and beyond.

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EXECUTIVE SUMMARY

Lessons Learnt from 16 years of Restoring the Atlantic Forest at a Trinational Level: the Upper Paraná in Argentina, Brazil and Paraguay.

Straddling Argentina, Brazil and Paraguay, the Upper Paraná Atlantic Forest (UPAF) ecoregion is one of the 15 priority ecoregions within the broader Atlantic Forest Complex and represents about a quarter of the remaining Atlantic Forest. It is not only home to numerous unique species such as the black lion tamarin or the giant otter, but it is also important for agriculture and hydroelectricity with two of the world's largest hydropower stations located here.

Forest cover once extended 39,442,271 ha across the three countries but only about 5,607,900 ha remain today (14%). Furthermore, remaining tracts are highly fragmented and the majority (70%) of remaining fragments are under 100 ha in size.

Main threats are conversion to agriculture and pasture land. Ranching, infrastructure, illegal hunting and unsustainable exploitation are also contributing to the degradation and loss of the forest.

Between 1998 and 2003, WWF and Fundación Vida Silvestre Argentina brought together more than 70 institutions and experts to define an 'ecoregion vision' for the Upper Paraná Atlantic Forest, producing a solid document that was to serve as the foundation for future interventions. Four implementation phases followed, with restoration at the core of the interventions.

Activities have included: working with landowners to change their attitudes towards the forest and to make restoration more economically viable for them; experimental restoration; trialling payments for ecosystem services (PES) and other market mechanisms; and policy and advocacy work to improve laws, ensure their applicability and support landowners to comply with these laws.

Deforestation continues to be a challenge. However, some results are visible. In both UPAF and the Serra do Mar, over 5,300 ha of Atlantic forests have been planted in eight watersheds since 2006 with WWF support. In Paraguay, the rate of deforestation has decreased between 82 to 95% since the baseline in 2003, thanks to the zero deforestation law, first enacted in 2004 ; WWF supported restoration (both planting and natural regeneration) of almost 15,000 ha. Jaguar numbers in the Upper Paraná have increased by 160% between 2005-2018.

WWF and Vida Silvestre have collaborated with numerous actors, from national governments to local farmers and indigenous communities, as well as other NGOs and scientific bodies. The private sector has also been an important stakeholder, with for example the hydroelectricity company Itaipú-Binacional being one of the main restoration implementers in the UPAF.

Capacity building has centred on improving knowledge about both the ecosystem and ways of restoring it. Many communications materials were produced and events held,

such as the 2014 WWF Annual Conference in Iguazu Falls which brought together WWF's CEOs and led to significant media coverage. Tenure, policies, informal decision-making processes and linking global targets to on the ground action have been important governance issues explored and addressed in forest landscape restoration (FLR) in the UPAF.

Financial sustainability remains fragile, although payments for ecosystem services and other involvement of the private sector can help secure longer term funding for conservation and restoration of the UPAF. Collaboration with local communities and other local actors has been essential for WWF and Vida Silvestre.

WWF and Vida Silvestre will continue to maintain their activities in this region at least until 2023 when the next ecoregion action plan finishes. After that, the organisations will have to decide how best to position themselves in the long term vis-à-vis the many actors in the region.

Key lessons learnt over the course of this project are:

1. **Lasting convening power of ecoregional planning -** Ecoregional planning provides a platform for convening multiple partners to reach one common biodiversity vision.

2. **Transboundary FLR planning can be effective for conservation, but implementation is always decided at the national and local levels -** Differing national and local social, political and economic contexts render transboundary FLR initiatives more complex. Large-scale interventions such as FLR, may require improved collaboration across countries in planning and defining priorities. However, the reality is that on the ground activities will need to be decided and implemented at the local and/or national level together with local stakeholders.

3. **Implementation at multiple scales -** Local, national, regional and even international actions can all contribute to an FLR initiative.

4. **Restoration is one of many interventions in a landscape -** Restoration takes place within a landscape within which there are many other priorities, interventions, projects and interests. FLR can complement other actions, such as jaguar conservation, but may also compete in some cases. Thus, promoting the convening power of the landscape approach (the L of FLR) is a delicate balance.

5. **Addressing the underlying drivers of deforestation is an essential part of FLR -** Drivers of deforestation are complex, and multi-scalar (e.g. related to international markets) but tackling them is central to a comprehensive FLR strategy.

6. **Diverse and innovative restoration strategies are needed in the context of ongoing deforestation -** Investing in long term restoration efforts in a landscape where deforestation is still occurring, and where newly 'restored' areas risk deforestation, requires specific tactics.

7. **Social movements, networks, partnerships, alliances and stakeholder platforms play a mobilising and multiplier role for FLR -** Through these informal and formal groups, FLR may be promoted and replicated more rapidly across a region or country.

8. **Permanent dialogue helps to maintain momentum and establish trust -** It is important for the proponents of FLR (and other large-scale conservation efforts) to be present locally and maintain open communication channels with all stakeholders, to understand their needs and priorities and to establish trust.

9. **Strong civil society organisations are required -** Capacity of civil society organisations on the ground often needs to be strengthened. To upscale FLR it is necessary to count on empowered local actors.

10 **Human qualities of project staff are decisive -** Patience, understanding, humility and respect are some of the key qualities necessary for project staff to be able to engage effectively with local stakeholders to achieve the considerable and long-term changes required for FLR.

11 **Inclusive implementation of FLR must recognise social realities -** Local stakeholders have rights and responsibilities in the framework of FLR which need to be recognised. In particular the multiple roles played by women are crucial in rural areas.

12 **Social and economic benefits from restoration need to be apparent to smallholders -** When restoration takes place on private land, smallholders need to see benefits, financial or otherwise, given the opportunity cost of setting land aside for restoring forests.

13 **Private companies are also actors in restoration -** Many sectors have a stake in FLR, from large industrial agribusiness and tree plantations, to the energy sector, the tourism sector, among others. Companies operating in these sectors depend on ecosystem services (e.g. water, soils, carbon) and social services (peaceful neighbourhood, employees...) from the landscape and also have an impact on the landscape and as such should contribute to upscale forest restoration. These companies can contribute to redesign diverse and resilient landscapes.

14 **The effective implementation and enforcement of legal and policy instruments contribute to FLR success -** Securing the right policy and legal framework alone is insufficient, but in combination with incentives, support and enforcement, they play an important role in FLR.

15 **Institutional arrangements need to be in place for the long term -** While policies and legislation that support FLR are necessary, the institutions to implement these effectively are equally important. These institutions need to be legitimate, empowered and lasting.

16 **Monitoring and evaluation need to be pragmatic and user friendly -** Monitoring is fundamental for learning and adaptive management, yet is often neglected in FLR. New tools and technologies contribute to facilitating monitoring. In addition, monitoring should not be seen only as a verification tool, but also as a means of improving efficiency, learning and as a source of inspiration.

17 **Forest landscape restoration requires time -** Medium and long term thinking and planning are needed considering the social and ecological timeframes for FLR.

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Reserva de Vida Silvestre Urugua-ı (Argentina).

SUMÁRIO EXECUTIVO

Lições aprendidas em 16 anos de Restauração de Mata Atlântica na escala trinacional: a Ecorregião do Alto Paraná na Argentina, Brasil e Paraguai.

Estendendo-se pela Argentina, Brasil e Paraguai, a ecorregião do Alto Paraná define-se como uma das 15 ecorregiões prioritárias dentro do complexo da Mata Atlântica e representa aproximadamente um quarto dos remanescentes de Mata Atlântica. Não apenas abriga várias espécies únicas, com o mico-leão-preto e a ariranha, mas também é importante para agricultura e geração de energia elétrica, com duas das maiores hidrelétricas localizadas nesta região.

A cobertura florestal estendia-se em 39,442,271 hectares entre os três países, mas hoje apenas restam 5,607,900 hectares (14%). Além disso os remanescentes de florestas encontram-se altamente fragmentados, com a sua maioria (70%) com tamanho inferior a 100ha.

As principais ameaças são a conversão de florestas para agricultura e pastagens. Pecuária, infraestrutura, caça ilegal e exploração não sustentável também contribuem para degradação e perda da floresta.

Entre os anos de 1998 e 2003, o WWF e a Fundación Vida Silvestre Argentina reuniram mais de 70 instituições e especialistas para definir um "visão para ecorregião do Alto Paraná", produzindo um sólido documento que serviu como base para todas intervenções futuras. Quatro fases de implementação se seguiram, com a restauração de florestas como um pilar central nas intervenções.

Atividades também incluíram: trabalhar com proprietários rurais para mudar suas atitudes em relação ao manejo da floresta e tornar a restauração economicamente viável para eles; testes experimentais de restauração; pilotos de projetos de pagamentos por serviços ambientais (PSA) e outros mecanismos de mercado; políticas públicas e advocacy para melhorar leis, garantir sua aplicação e apoio aos proprietários de terra para seu cumprimento.

O desmatamento continua sendo um grande desafio. No entanto, alguns resultados são notáveis. Nas ecorregiões da Serra do Mar e Alto Paraná, mais de 5.300 hectares de florestas de Mata Atlântica foram restauradas em oito microbacias desde 2006 com apoio do WWF. No Paraguai, a taxa de desmatamento diminui entre 82 a 95% desde sua linha de base em 2003, graças a Lei de de desmatamento zero, promulgada pela primeira vez em 2004. WWF apoiou restauração (plantio direto e regeneração natural) de aproximadamente 15.000 hectares. As populações de onça-pintada aumentaram 160% entre 2005 e 2018.

WWF e Fundación Vida Silvestre colaboraram com várias atores, desde governos locais, produtores rurais e comunidades indígenas, como outras ONGs e instituições de pesquisa. O setor privado também tem sido um importante stakeholder, como por exemplo a Itaipu-Binacional, empresa do setor hidrelétrico, um dos principais implementadores de restauração na ecorregião do Alto Paraná.

O desenvolvimento de capacidades foram centrais para melhorar tanto o conhecimento sobre os ecossistemas como as maneiras de restaurá-lo. Muitos materiais de comunica-

ção foram produzidos e eventos organizados, como a Conferência Anual do WWF em 2014 no Parque Nacional de Iguaçu que reuniu CEOs da rede WWF e trouxe bastante destaque na cobertura de mídia. Questões fundiárias, políticas, processos informais de tomada de decisão e conexões de metas globais com ações de campo são importantes temas de governança explorados e endereçados pela Restauração de Paisagens Florestais (RPF) na Ecorregião do Alto Paraná

A sustentabilidade financeira continua sendo frágil, embora pagamentos por serviços ecossistêmicos e outras formas de envolvimento do setor privado podem garantir financiamento longo prazo para conservação e restauração da ecorregião do Alto Paraná. Colaboração com comunidades locais e outros atores locais tem sido essencial para atuação do WWF e da Fundación Vida Silvestre Argentina.

O WWF e a Vida Silvestre continuarão mantendo suas atividades na região até pelo menos 2023, quando o próximo Plano de Ação Ecorregional termina. Depois disso, a organização terá que decidir a melhor maneira de se posicionar a longo prazo contra os muitos atores e desafios da região.

Principais lições aprendidas ao longo desse projeto são:

1. **Poder de convocação duradouro do planejamento ecorregional -** O planejamento ecorregional fornece uma plataforma para convocar múltiplos parceiros para alcançar uma visão de biodiversidade comum.

2. **O planejamento transfronteiriço de Restauração em Paisagens Florestais (RPF) pode ser efetivo para a conservação, mas sua implementação é sempre decidida a nível nacional e local -** Diferentes contextos sociais, políticos e econômicos em escalas nacionais e locais tornam as iniciativas transfronteiriças de RPF mais complexas. Iniciativas de larga escala, como o caso da RPF, podem exigir colaboração adicional entre os países em relação ao planejamento e estabelecimento de prioridades. No entanto, a realidade é que as atividades de campo devem ser decididas e implementadas na escala local e / ou na escala nacional, em conjunto com as partes interessadas locais.

3. **Implementação em múltiplas escalas -** Ações locais, nacionais, regionais e até internacionais podem contribuir para iniciativa de RPF.

4. **Restauração é uma entre muitas intervenções em uma paisagem -** A restauração ocorre em uma paisagem na qual existem muitas outras prioridades, intervenções, projetos e interesses. A RPF pode complementar outras ações, como a conservação da onça-pintada, mas também pode competir em alguns casos. Assim, promover o poder de convocação da abordagem da paisagem (o P da RPF) é um equilíbrio delicado.

5. **Abordar os fatores subjacentes ao desmatamento é uma parte essencial da RPF -** Os fatores motivadores do desmatamento são complexos e de múltiplas escalas (por exemplo, relacionados a mercados internacionais), mas combatê-los é fundamental para uma estratégia abrangente de RPF.

6. **Diferentes e inovadoras estratégias de restauração são necessárias no contexto do desmatamento em andamento -** Investir em esforços de restauração de longo prazo e maior persistência em um cenário em que o desmatamento ainda está ocorrendo e onde “áreas recém-restauradas” correm o risco de desmatamento, exige táticas específicas.

7. **Movimentos sociais, redes, parcerias, alianças e plataformas de partes interessadas desempenham um papel mobilizador e multiplicador para a RPF -** Por meio desses grupos informais e formais, a RPF pode ser promovida e replicada mais rapidamente em uma região ou país.

8. **O diálogo permanente ajuda a manter a dinâmica e a estabelecer confiança -** É importante que os proponentes da RPF (e outros esforços de conservação em larga escala) estejam presentes localmente e mantenham canais abertos de comunicação com todas as partes interessadas, para entender suas necessidades e prioridades e estabelecer confiança.

9. **Organizações da sociedade civil são necessárias -** A capacidade das organizações da sociedade civil locais geralmente precisa ser fortalecida. Para melhorar a RPF, é necessário contar com atores locais capacitados.

10. **As qualidades humanas da equipe do projeto são decisivas -** Paciência, compreensão, humildade e respeito são algumas das principais qualidades necessárias para que a equipe do projeto possa se engajar efetivamente com as partes interessadas locais, alcançando assim as transformações de longo prazo necessárias para a RPF.

11. **A implementação inclusiva da RPF deve reconhecer as realidades sociais -** As partes interessadas locais têm direitos e responsabilidades na estrutura da RPF que precisam ser reconhecidas. Em particular, os múltiplos papéis desempenhados pelas mulheres são cruciais nas áreas rurais.

12. **Os benefícios sociais e econômicos para os pequenos agricultores resultantes da restauração precisam ser aparentes -** Quando a restauração ocorre em terras privadas, os pequenos proprietários precisam ver os benefícios, financeiros ou outros, dado o custo de oportunidade de disponibilizar parte de suas propriedades para restauração.

13. **Empresas privadas também são atores na restauração -** Muitos setores têm participação na RPF, desde grandes empresas do agronegócios e florestais, até o setor de energia, o setor de turismo, entre outros. As empresas que operam nesses setores dependem de serviços ecossistêmicos (por exemplo, água, solo, carbono) e serviços sociais (apoio das comunidades do entorno e funcionários engajados) da paisagem e também têm um impacto na paisagem e, como tal, devem contribuir para a escalonar a restauração florestal. Essas empresas podem contribuir para redesenhar paisagens diversas e resilientes.

14. **A efetiva implementação e aplicação dos instrumentos legais e políticos contribuem para o sucesso da RPF -** Garantir a política certa e o quadro jurídico adequados por si só é insuficiente, mas em combinação com incentivos, apoio e aplicação legal, eles desempenham um papel importante na RPF.

15. **Os arranjos institucionais precisam estar presentes com visão de longo prazo -** Embora sejam necessárias políticas e legislação que apóiam a RPF, as instituições para implementá-las efetivamente são igualmente importantes. Essas instituições precisam ser legítimas, empoderadas e duradouras.

16. **O monitoramento e a avaliação precisam ser pragmáticos e fáceis de usar -** O monitoramento é fundamental para o aprendizado e o manejo adaptativo, mas é muitas vezes negligenciado na RPF. Novas ferramentas e tecnologias contribuem para facilitar o monitoramento. Além disso, o monitoramento não deve ser visto apenas como uma ferramenta de verificação, mas também como um meio de melhorar a eficiência, o aprendizado e como uma fonte de inspiração.

17. **A restauração da paisagem florestal requer tempo -** É necessário pensar e planejar a médio e longo prazo, considerando os prazos sociais e ecológicos da RPF.

RESUMEN EJECUTIVO

Lecciones aprendidas en 16 años y restauración del Bosque Atlántico a nivel trinacional: el Alto Paraná en Argentina, Brasil y Paraguay.

Repartida entre Argentina, Brasil y Paraguay, la ecorregión del Bosque Atlántico del Alto Paraná se define como una de las 15 ecorregiones prioritarias dentro del amplio Complejo del Bosque Atlántico y representa aproximadamente una cuarta parte del Bosque Atlántico remanente. No sólo alberga numerosas especies únicas, como el tití león negro o la nutria gigante, sino que también representa un área de importancia para la agricultura y la generación de energía, contando con dos de las centrales hidroeléctricas más grandes del mundo.

En su momento la cobertura forestal abarcaba 39,442,271 ha entre los tres países, pero actualmente sólo quedan unas 5,607,900 ha (14%). Además, los remanentes están muy fragmentados, siendo la mayoría de los parches (70%) menores de 100 ha de extensión.

Las principales amenazas son la conversión del bosque para la agricultura y las tierras de pastoreo. Cabe mencionar que la ganadería, la infraestructura, la caza ilegal y la explotación no sostenible, también están contribuyendo a la degradación y pérdida del bosque.

Entre los años 1998 y 2003, WWF y Fundación Vida Silvestre Argentina reunieron a más de 70 instituciones y expertos con el fin de definir una "visión ecorregional" para el Bosque Atlántico del Alto Paraná, produciendo un documento sólido que sirviera de base para futuras intervenciones. Siguieron cuatro fases de implementación, con la restauración como el núcleo de las intervenciones.

Las actividades incluían: trabajar con los propietarios de las tierras para cambiar sus actitudes con respecto al bosque y hacer que la restauración sea económicamente viable para ellos; realizar restauración experimental; poner a prueba pagos por servicios ecosistémicos (PSA) y otros mecanismos de mercado; así como el trabajo de cabildeo para incidir en políticas públicas a fin de mejorar las leyes, asegurar su aplicabilidad y apoyar a las partes interesadas en el cumplimiento de dichas leyes.

La deforestación continúa siendo un desafío. Sin embargo, se están viendo algunos resultados. Tanto en paisajes del Bosque Atlántico del Alto Paraná, como de la Serra do Mar, se ha iniciado el proceso de restauración de más de 5.300 ha de la Bosque Atlántico, en ocho cuencas desde el año 2006 como resultado del apoyo de WWF. En Paraguay, desde la línea de base definida en 2003 se ha disminuido la tasa de deforestación entre 82 y 95%, gracias a la ley de deforestación cero, promulgada por primera vez en 2004; WWF ha apoyado la restauración (tanto plantación como regeneración natural) de casi 15.000 ha., asimismo, entre el 2005-2018 en el Alto Paraná ha aumentado el número de jaguares en un 160%.

WWF y Vida Silvestre han colaborado con numerosos actores, desde gobiernos nacionales hasta agricultores locales y comunidades indígenas, así como también otras ONGs y organismos científicos. El sector privado ha sido también un importante colaborador, como por ejemplo el caso de la empresa hidroeléctrica Itaipú-Binacional, una de las principales implementadoras de la restauración en el Bosque Atlántico del Alto Paraná.

El desarrollo de las capacidades se ha centrado en mejorar el conocimiento tanto del ecosistema como de las formas de restaurarlo. Se elaboraron muchos materiales de comunicación y se han llevado a cabo diversos eventos, como la Conferencia Anual de WWF en 2014 realizada en las Cataratas del Iguazú, que reunió a los CEOs de WWF y que generó una amplia cobertura mediática. La tenencia de la tierra, la promoción de políticas, los procesos informales de toma de decisiones y la vinculación de objetivos globales con la acción en terreno, han sido cuestiones importantes exploradas y abordadas en la Restauración del Paisaje Forestal (RPF), en el Bosque Atlántico del Alto Paraná.

La sostenibilidad financiera continúa siendo frágil, aunque los pagos por servicios ecosistémicos y otras intervenciones del sector privado pueden ayudar a asegurar plazos más prolongados de financiación para la conservación y restauración del Bosque Atlántico del Alto Paraná. También la colaboración con las comunidades y otros actores locales, ha sido esencial para WWF y Vida Silvestre Argentina.

WWF y Vida Silvestre continuarán manteniendo sus actividades en esta región al menos hasta 2023, cuando finalice el próximo Plan de Acción Ecorregional. Luego de esto, las organizaciones tendrán que decidir la mejor manera de posicionarse en el largo plazo frente a los numerosos actores y desafíos de la región.

Las lecciones aprendidas en el transcurso de este proyecto son:

1. **Poder de convocatoria duradero de la planificación ecorregional -** La planificación ecorregional proporciona una plataforma para convocar a múltiples socios a alcanzar una visión común de biodiversidad.
2. **La planificación transfronteriza del RPF puede ser efectiva para la conservación, pero su implementación siempre se decide a nivel nacional y local -** Los diferentes contextos sociales, políticos y económicos, tanto nacionales como locales, hacen que las iniciativas transfronterizas de RPF sean más complejas. Las intervenciones a gran escala, como el caso de RPF, pueden requerir una mayor colaboración entre países con respecto a la planificación y a la definición de prioridades. Sin embargo, la realidad es que las actividades de campo deberán ser decididas e implementadas, tanto a nivel local y/o nacional, en conjunto con las partes interesadas locales.
3. **Implementación a múltiples escalas -** Las acciones tanto locales, nacionales, regionales e incluso internacionales pueden contribuir a una iniciativa de RPF.
4. **La restauración es sólo una de las tantas intervenciones en un paisaje -** La restauración se realiza en un área dentro de la cual hay otras prioridades, intervenciones, proyectos e intereses. La RPF puede complementar otras acciones, como por ejemplo la conservación del yaguareté, pero también, en algunos casos, puede competir con otras actividades. Por lo tanto, promover el enfoque de Paisaje (la P de RPF) implica un delicado equilibrio.
5. **Abordar las causas principales de la deforestación es una parte esencial de la RPF -** Las causas responsables de la deforestación son complejas y de múltiples escalas (por ejemplo: las relacionadas con los mercados internacionales), pero abordarlas es fundamental para una estrategia integral de RPF.
6. **Se necesitan estrategias de restauración diversas e innovadoras en el contexto de la deforestación en curso -** Invertir en esfuerzos de restauración a largo plazo en un terreno donde la deforestación sigue ocurriendo, y donde las áreas recientemente "restauradas" corren el riesgo de deforestación, requiere de tácticas específicas.
7. **Los movimientos sociales, redes, asociaciones, alianzas y plataformas de partes interesadas desempeñan un rol movilizador y multiplicador para la RPF -** A través de estos grupos informales y formales, la RPF puede ser promovida y replicada más rápidamente a través de una región o del país.

8. **El diálogo permanente ayuda establecer la confianza y a mantener el impulso -** Es importante que los proponentes de la RPF (así como otros esfuerzos de conservación a gran escala) estén presentes localmente y mantengan canales de comunicación abiertos con todas las partes interesadas, con el fin de comprender sus necesidades y prioridades y también para establecer la confianza.

9. **Se requiere el fortalecimiento de las Organizaciones de la Sociedad Civil -** Usualmente se necesita fortalecer la capacidad de las organizaciones de sociedad civil en terreno. Para aumentar la RPF es necesario contar con actores locales empoderados.

10. **Las cualidades humanas del staff del proyecto son decisivas -** La paciencia, la comprensión, la humildad y el respeto, son algunas de las cualidades claves necesarias en el staff del proyecto para que se logre un vínculo efectivo con las partes locales interesadas y así lograr cambios considerables y a largo plazo requeridos para la RPF.

11. **La implementación inclusiva de la RPF debe reconocer las realidades sociales -** Las partes interesadas locales tienen derechos y responsabilidades en el marco de la RPF, los cuales deben ser reconocidos. Principalmente los diversos roles desempañados por mujeres que son cruciales en las zonas rurales.

12. **Es necesario que los beneficios sociales y económicos para los pequeños productores locales sean evidentes -** Cuando la restauración se lleva a cabo en tierras privadas, los pequeños productores locales deben ver los beneficios, financieros o de otro tipo, dado el costo de oportunidad de reservar tierras para restaurar los bosques.

13. **Las empresas privadas también participan en la restauración -** Diversos sectores tienen algún interés en la RPF, desde grandes empresas agrícolas y forestales, hasta el sector energético, como también el sector turístico, entre otros. Las empresas que operan en estos sectores dependen de los servicios ecosistémicos (por ejemplo: agua, suelos y carbono) y servicios sociales (licencia social, empleados satisfechos) del terreno; y también tienen un impacto en el terreno y, como tal, deberían contribuir a la restauración forestal a una escala apropiada. Estas empresas pueden contribuir a rediseñar paisajes diversos y resilientes.

14. **La implementación efectiva y el cumplimiento de los instrumentos legales y políticos contribuyen al éxito de la RPF -** Garantizar solamente la existencia de políticas y el marco legal adecuado, no es suficiente, pero en combinación con incentivos, apoyos y aplicación efectiva; juegan un papel importante en la RPF.

15. **Deben establecerse acuerdos institucionales a largo plazo -** Si bien las políticas y la legislación que respaldan la RPF son necesarias, las instituciones para implementarlas de manera eficiente son igualmente importantes. Estas instituciones deben ser legítimas, capacitadas y duraderas.

16. **El monitoreo y la evaluación deben ser pragmáticos y fáciles de usar -** El monitoreo es fundamental para el aprendizaje y la gestión adaptativa, sin embargo, por lo general se descuida en la RPF. Nuevas herramientas y tecnologías contribuyen a facilitar el monitoreo. Además, el monitoreo no debe ser tomado solamente como una herramienta de verificación, sino también como un medio para mejorar la eficiencia, el aprendizaje y también como una fuente de inspiración.

17. **La restauración del paisaje forestal requiere tiempo -** Se necesitan períodos de mediano y largo plazo para pensar y planificar, teniendo en cuenta los plazos sociales y ecológicos para la RPF.

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INTRODUCTION

Situated along the Atlantic coast of Brazil and inland to parts of north-eastern Argentina and eastern Paraguay, the Atlantic Forest Complex is considered one of the world's biodiversity hotspots (Myers *et al.*, 2000). It is probably best known for its breathtaking Iguazu Falls along the Brazil/Argentina border and its remarkable landscape in Rio de Janeiro city. In reality, the Atlantic Forest Complex is made up of 15 ecoregions (di Bitetti *et al.*, 2003). It is composed of tropical and subtropical rainforest, including coastal forest, mangrove and the Araucaria moist forest.

While the Atlantic Forest may not have the same widespread recognition power as the Amazon, it is of tremendous global importance for its species richness: 7% of the Earth's plant species and 5% of the vertebrate species are found in the Atlantic Forest (Vida Silvestre and WWF, 2017). In just one hectare of Atlantic Forest, a total of 443 species of trees were recorded (Vida Silvestre and WWF, 2017).

Rates of endemism must be highlighted too: more than one third of the 2,300 vertebrate species found here are found nowhere else on earth. Among plants, the rate of endemism is extremely high with about 50% of the 19,355 known species being endemic (Forzza *et al.*, 2012). Overall more than 70 of the Atlantic Forest's 260 mammal species are endemic (CEPF, 2001). Fifteen percent of the bird species are endemic, as are about 30% of reptiles and 50% of amphibian species.

THE ATLANTIC FOREST IS OF TREMENDOUS GLOBAL IMPORTANCE FOR ITS SPECIES RICHNESS.

Not limited to the Atlantic Forest, the jaguar (*Panthera onca*) plays an important role in shaping the ecosystem as a top predator and 'umbrella species'. Near-threatened at the global level, it is classified as critically endangered in Argentina and vulnerable in Brazil. Today only two populations of over 50 individuals exist in the Atlantic forest complex in the Serra do Mar and Upper Paraná ecoregions, the remaining smaller populations being scattered in 11 other isolated fragments (Paviolo *et al.*, 2016). Other mammals found here include the endangered golden lion tamarins (*Leontopithecus rosalia*), the critically endangered northern and southern muriqui (*Brachyteles hypoxanthus* and *Brachyteles arachnoides* respectively), the vulnerable thin-spined porcupine (*Chaetomys subspinosus*), the endangered painted tree rat (*Callistomys pictus*) and the vulnerable maned sloth (*Bradypus torquatus*). The more than 930 bird species found in the Atlantic forest include the endangered red-billed curassow (*Crax blumenbachii*), the critically endangered Brazilian merganser (*Mergus octosetaceus*) and the vulnerable red-browed Amazon (*Amazona rhodocorytha*) (CEPF, 2001).

New species continue to be found in this rich forest complex, despite its current state. Indeed, since 1990 more than 30 mammal species, 9 bird species, and about 100 species of frogs have been discovered (Paglia *et al.*, 2012; Ribeiro *et al.*, 2015). This biological wealth has been attributed in part to the high latitudinal variation of the Atlantic Forest Complex (8 degrees) and to its significant altitudinal range (from sea level to 1,800 metres) (CEPF, 2001).

Atlantic Forest history and context vary from one country to another (Table 1). Although there is evidence of human settlement in the Atlantic Forest dating back 11,000 years, it is only starting with the colonial period in the 1500s that humans began to modify and convert the Atlantic Forest in Brazil where its strategic coastal location has been its downfall (Dean, 1995). Its history has been shaped by extraction of natural resources and deforestation. Today 70% of Brazil's GDP (gross domestic product) is generated from inside the Atlantic Forest complex region which is also where two of the world's major cities are situated: Sao Paulo and Rio de Janeiro (Calmon *et al.*, 2011). Conversion in Argentina and Paraguay is much more recent (less than 100 years), with

intensive logging followed by crops (such as soya) and cattle, to feed the growing international market for both commodities (Vida Silvestre and WWF, 2017). In the specific case of Argentina, the target municipality of Andresito in Misiones region was established in the 1970s when settlers were encouraged to move there (to ward off Brazilian and Paraguayan encroachment) and to convert forest into productive land. Perverse incentives can thus be blamed for a substantial proportion of forest loss in Andresito.

A total of close to 150 million people live in the area where the forest ecosystem sustains human populations through the provision of several ecosystem services. For example, it has been estimated that one hectare of forest here can store an average of 223.5 tonnes of carbon (Gasparri *et al.*, 2008). Importantly, these forests and their rivers have been used to produce hydroelectricity amounting to 62% of Brazil's electricity, 75% of Paraguay's and 60% of Argentina's (Vida Silvestre and WWF, 2017) and to provide water for the growing population and industry. Today, vast areas of this erstwhile forest have been replaced with infrastructure, industrial plantations and agriculture. Yet, some old-growth forest fragments remain interspersed in this mosaic landscape of degraded forest, agriculture, pasture, intensive forestry and urban areas (Rezende *et al.*, 2018).

Recent estimates place the total remaining area of native forest at somewhere between 11% and 16% (estimated at about 22 million ha) from what was there in pre-colonial times, with some more recent estimates at 28% or 32 million ha (Rezende *et al.*, 2018). Remaining forest is however greatly fragmented, with as many as 20,000 fragments identified across the three countries, the majority of which (70%) are less than 100 ha in size (Vida Silvestre and WWF, 2017). Such small habitat patches are insufficient for keystone species such as the jaguar which has basically disappeared from 96% of the fragments smaller than 10,000 ha in size (Paviolo *et al.*, 2016).

Table 1. The Atlantic Forest complex in a few figures (source CEPAN, 2019)

	Name	Argentina	Brazil	Paraguay
Country	Area (ha)	278,040,000	851,600,000	40,675,200
Population	Country level	44,938,712	209,501,068	7,052,983
	Inside Atlantic Forest complex	1,101,593	146,650,747	6,347,684
		2.45%	70%	90%
Atlantic forest	Original area (ha)	2,980,900	131,029,898	8,599,493
	Current forest cover	58%	15%	20%
	Main threats	Agriculture (tea, yerba mate), illegal logging, plantations, intensive livestock	Urbanisation, industrialisation, NTFP extraction (palmito jussara), illegal hunting	Agriculture (soy) and unsustainable timber extraction
Protected areas	Number of protected areas	75	1,257	37
	Area protected (ha)	468,359	11,553,664	561,702

Starting in 1995, WWF and its partners began working in the Atlantic Forest Complex prioritising two (out of 15) ecoregions: the trinational (Argentina, Brazil and Paraguay) Upper Paraná Atlantic Forest and the Serra do Mar Coastal Forest in Brazil. In 2000, the trinational Upper Paraná Atlantic Forest ecoregion programme was born. With only 2.8% of the Atlantic Forest under strict protection and another 5.4% under some form of protection (Vida Silvestre and WWF, 2017), from early on it became clear to WWF and Fundación Vida Silvestre Argentina (Vida Silvestre) that restoration had to be a key component of any conservation strategy in this highly fragmented ecoregion.

THE TRINATIONAL UPPER PARANÁ ATLANTIC FOREST ECOREGION PROGRAMME WAS BORN IN 2000.

This report reviews the lessons learnt from 16 years of work on forest landscape restoration in one of the ecoregions of the Atlantic Forest Complex: the Upper Paraná Atlantic Forest.

FLR in WWF's Global Forest Programme

Forest landscape restoration was defined as "*a planned process that aims to regain ecological integrity and enhance human wellbeing in deforested or degraded landscapes*" (WWF and IUCN, 2000).

WWF's 'Forests for Life' programme during the period 2001-2006 centred around three global targets: protected areas, sustainable forest management and FLR. The FLR target was "to undertake at least twenty FLR initiatives in the world's threatened, deforested or degraded forest regions to enhance ecological integrity and human well-being by 2005". WWF contributed specific steps along the way to this global target, including leading the implementation of 10 long-term FLR initiatives.

Outside the WWF network, much has been achieved at an international level to raise the political profile of FLR and to advance technical understanding through implementation in key landscapes (Mansourian and Vallauri, 2014).

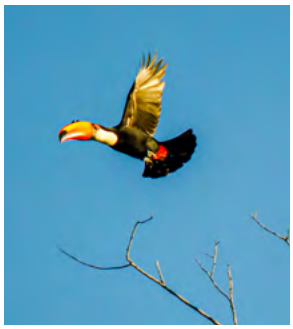
Today, WWF's Global Forest Strategy includes as one of its ambitions to contribute to the international effort to restore "350 million hectares of forest landscapes" by 2030 (New York Declaration on Forests and Bonn Challenge on FLR). These global efforts aim to reverse the trend of forest loss and degradation by putting an emphasis on restoring the ecological functions of degraded forest landscapes.

WWF's global work on FLR is set up as an Area of Collective Action and Innovation (ACAI) with active chapters in Africa, Latin America, Asia-Pacific and Europe. About 200 staff contribute to the ACAI. WWF is an active member of the Global Partnership on Forest Landscape Restoration and is participating in the Initiative 20x20.

PRESENTATION OF THE LANDSCAPE

At the border between Brazil, Argentina and Paraguay, the Upper Paraná Atlantic Forest (UPAF) ecoregion is one of the 15 priority ecoregions within the broader Atlantic Forest Complex and represents between 24-36% (depending on methodology applied) of the whole remaining Atlantic Forest (Vida Silvestre and WWF, 2017 ; CEPAN, 2019). In the framework of this report, the Upper Paraná can be considered the 'landscape', the land we focus on, within which connectivity and functionality are to be restored, even if, given its size, this is considered in other analyses and conservation planning as an ecoregion in its own right (Figures 1 and 2).

In the Upper Paraná, the forest is composed mainly of semi-deciduous tree species such as the marmelero (*Ruprechtia laxiflora*) and the endangered guatambú (*Balfourodendron riedelianum*). Deciduous species include the jacaranda (*Jacaranda micrantha*), the vulnerable cedro (*Cedrela fissilis*), the ipês (*Tabebuia ipe*) and the cabriúva (*Myrocarpus frondosus*). Evergreen species such as the endangered peroba rosa (*Aspidosperma polyneuron*) are also present. Some gallery forests, bamboo forests and ancient araucaria (or Brazilian pine - *Araucaria angustifolia*) forests can also be found (di Bitetti *et al.*, 2003). Forest fragments represent a mix of recovering secondary forest and primary forests (Figure 3).



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Numerous wildlife species inhabit the Upper Paraná including the vulnerable tapirs (*Tapirus terrestris*), the endangered black lion tamarin (*Leontopithecus chrysopygus*), the endangered giant otter (*Pteronura brasiliensis*), the near-threatened jaguars (*Panthera onca*) and about 500 bird species, including five species of toucans (*Ramphastos toco, Ramphastos dicolorus, Pteroglossus castanotis, Baillonius bailloni,* and *Selenidera maculirostris*) (di Bitetti *et al.*, 2003).

The Upper Paraná as the restoration landscape

Although it is an ecoregion of the Atlantic Forest, in the context of this report, the Upper Paraná represents the landscape to be restored in Argentina, Brazil and Paraguay. A landscape in this context is the area used for planning purposes, whilst concrete restoration interventions take place at a lower scale. Within the Upper Paraná, the 18 landscape units that were identified are called 'sub-landscape units' for our purposes.

The UPAF is particularly important for agriculture and hydroelectricity. Indeed, two of the world's largest hydropower stations are located here: Itaipú-Binacional and Yacyretá (di Bitetti *et al.*, 2003). While densely populated on the Brazilian side, this part of Argentina and Paraguay still presents large tracts of unspoilt forest.

Forest cover of the UPAF once extended 39,442,271 ha across the three countries but only about 5,607,900 ha remain today (14%). Brazil retains about 9% of its original Atlantic Forest in the Upper Paraná, situated essentially in protected areas, notably in the Iguaçu National Park, the Morro do Diabo State Park and the Turvo State Park; Paraguay retains about 20% of the area of Atlantic Forest originally present in the country (although it is highly fragmented, isolated and degraded); Argentina has retained 54% of its original Atlantic Forest cover at 1.22 million ha in the northernmost province of Misiones includ-

ing the Iguazu National Park and the Urugua-í Provincial Park (Vida Silvestre and WWF, 2017; Table 2). Core forest areas represent less than 2% (in a total of 124 fragments) while edge forests also cover just under 2% and there are 16,401 isolated forest patches of less than 1,000 ha. Fragmentation is a challenge, with 124 forest fragments representing core areas larger than 1,000 hectares. The majority (70%) of remaining fragments, are under 100 ha in size (Vida Silvestre and WWF, 2017).

At the core of Upper Paraná, and straddling Argentina and Brazil lies the world famous and UNESCO World Heritage Site of the Iguazú Falls. These majestic falls attract close to 2 million tourists each year. Adjacent to this binational park, are Argentina's Urugua-í and Foerster Provincial Parks, making this core zone the largest protected forest block in the ecoregion with a total of 335,000 hectares.

Main threats to the native Atlantic Forest here are essentially conversion to agriculture and pasture land, with some variations according to the country. With much of the land ownership in private hands, conversion of the forest for maize, soy and cattle is prevalent. Ranching, infrastructure, illegal hunting and unsustainable exploitation are also contributing to the degradation and loss of the forest. Deforestation along springs and water courses is affecting water quality and flow.

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Table 2. Upper Paraná Atlantic Forest: estimated original forest cover versus cover in 2014

	Argentina	Brazil	Paraguay	Total
Original forest cover estimate from 15th-16th centuries (di Bitetti *et al.*, 2003)	2,246,000 ha	28,565,778 ha	8,599,493 ha	39,442,271 ha
Remaining forest cover in 2014 (Vida Silvestre and WWF, 2017)	1,221,000 ha	2,645,000 ha	1,741,900 ha	5,607,900 ha
	54%	9%	20%	14%

The landscape

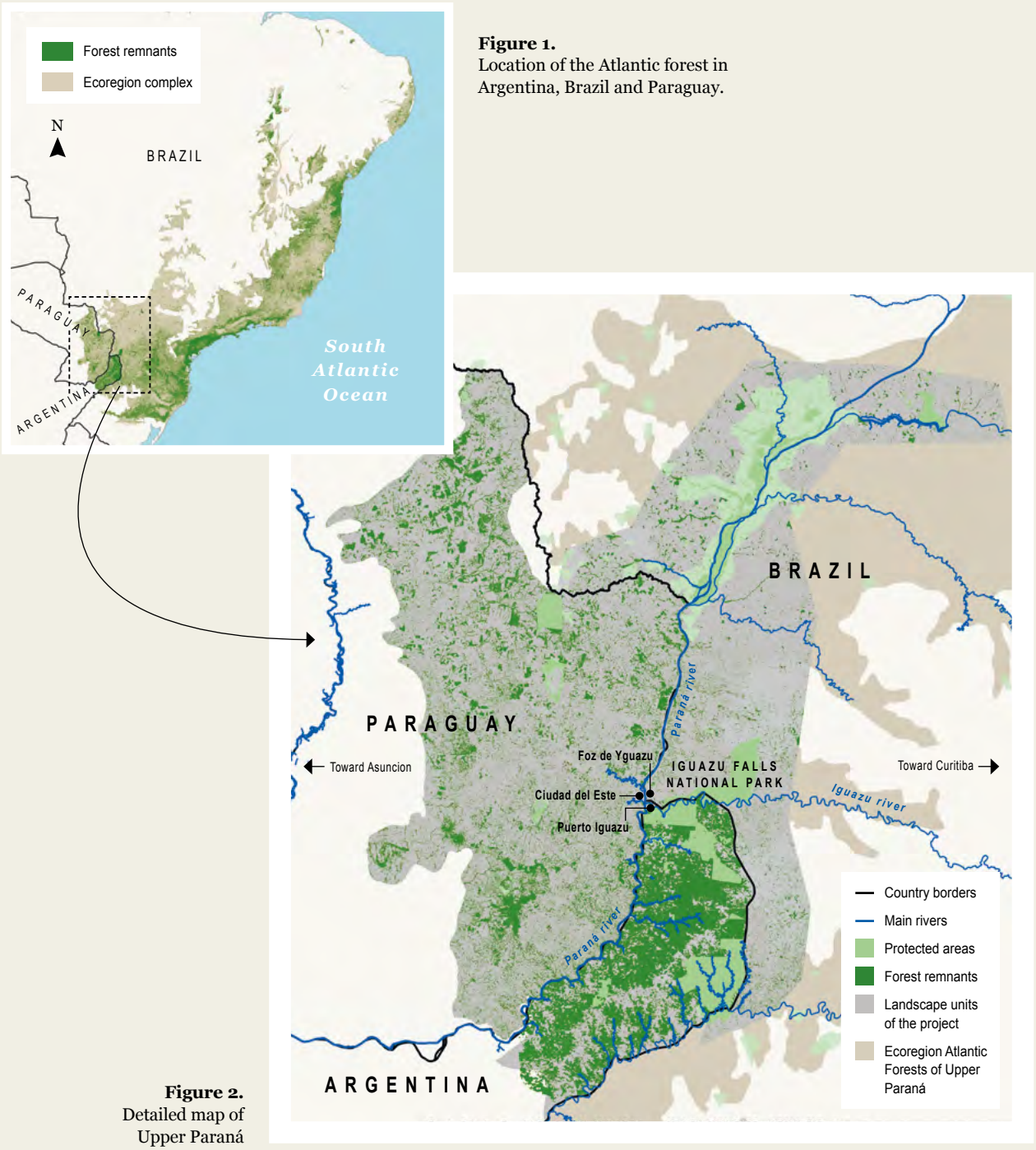


Figure 1.
Location of the Atlantic forest in Argentina, Brazil and Paraguay.

Figure 2.
Detailed map of Upper Paraná

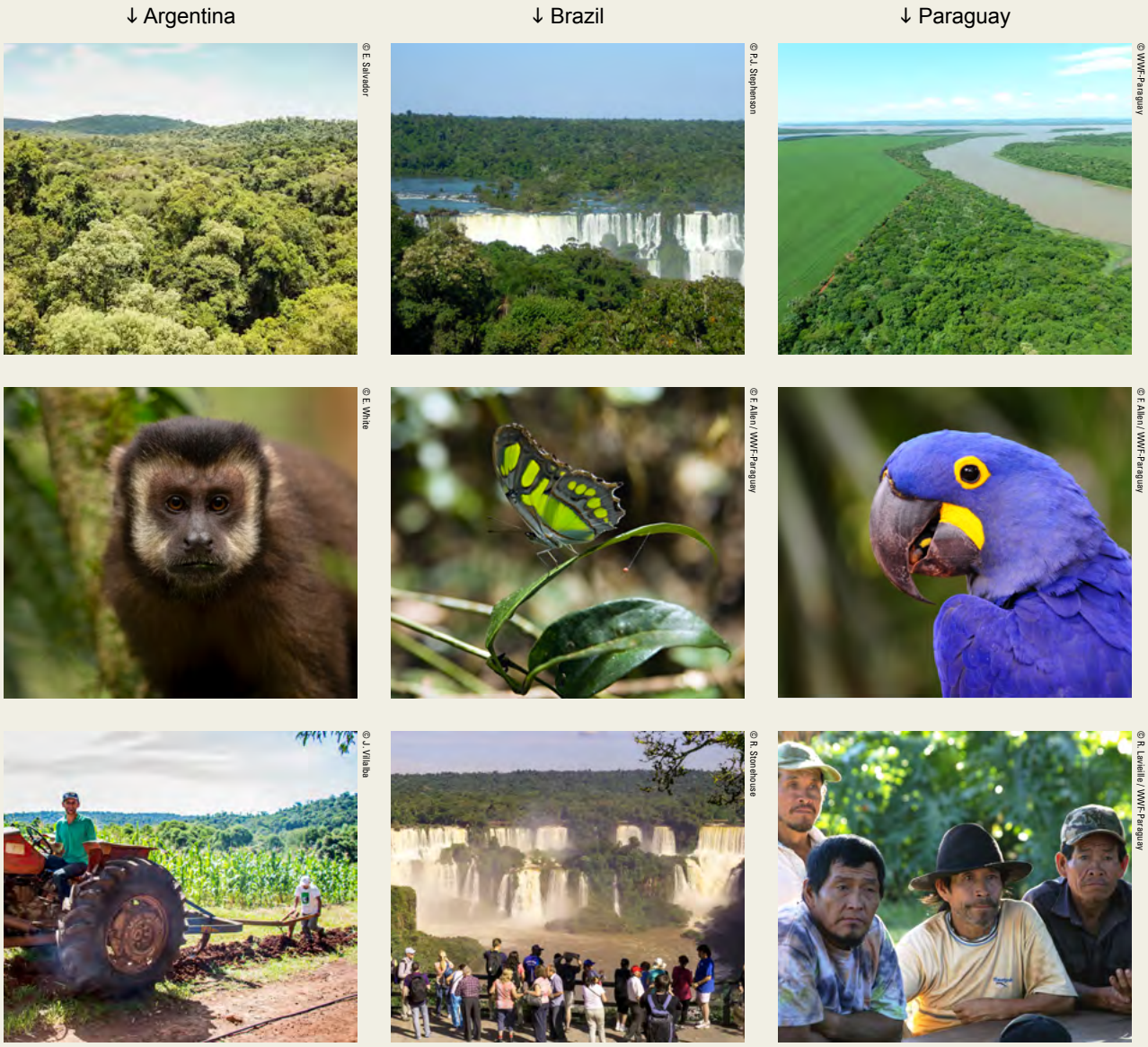
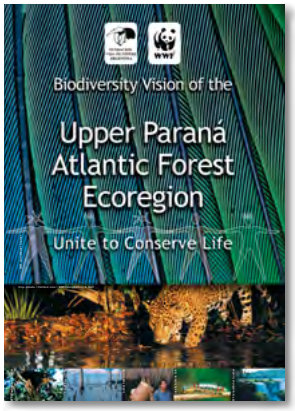


Figure 3. Upper Paraná in a few images.

PROJECT PHASES

At the turn of the 21st century WWF and partners from Argentina, Brazil and Paraguay began a three-year ecoregional planning process that was to culminate in the production of an ecoregion vision document for the Trinational Upper Paraná Atlantic Forest ecoregion (di Bitetti *et al.*, 2003). More than 70 institutions and experts contributed to the production of this document which was to serve as the foundation for future interventions (di Bitetti *et al.*, 2003). At about the same time, an office of WWF's partner organisation in Argentina – Fundación Vida Silvestre Argentina (Vida Silvestre) - was set up for the Atlantic Forest in Puerto Iguazú, in the province of Misiones, and in April 2000, the WWF office in the Atlantic Forest was established in Paraguay. This first inception phase of the programme (Table 3) served to establish solid foundations, engage partners and determine priorities.



The 'Biodiversity Vision of the Upper Paraná Atlantic Forest Ecoregion' published in 2003 (di Bitetti *et al.*, 2003) has been a landmark document, used to this day.

In 2003, agreement was reached to establish a 'Green Corridor' across the three countries sharing one of the last and most substantial stretches of Atlantic Forest along the middle reaches of the Paraná river. In 2004, WWF in collaboration with over 30 partners in Brazil, Paraguay and Argentina finalised a participatory biodiversity vision process outlining critical conservation areas (core areas and corridors) for the entire ecoregion. Through this process, 18 sub-landscape units were identified within the UPAF. Sub-landscape units are the levels at which field implementation can occur and where specific planning, implementation and monitoring takes place within the framework and objectives of the ecoregion. For the UPAF, these sub-landscapes are preferably chosen because of their administrative scale or because they represent a watershed. Four conservation goals were defined per sub-landscape unit:

1. The conservation of blocks of natural forest large enough to be resilient to short-term and long-term environmental changes;
2. The maintenance of viable populations of all native species in their natural patterns of abundance and distribution, and with the genetic diversity necessary to meet environmental challenges;
3. The maintenance of healthy ecological processes and selective factors such as disturbance regimes, hydrological processes, nutrient cycles, and biotic interactions, including predation;
4. The representation of all native biological communities and seral stages across their natural range of variation within a biodiversity conservation landscape.

Out of these 18 sub-landscape units some were prioritised for action over others because of the opportunities they presented. For example, the eight sub-landscapes containing over 10,000 ha of forest were prioritised as core areas. The jaguar's habitat requirements were used to design a biodiversity conservation landscape. An estimated 525,000 ha of continuous forest cover is considered necessary for a viable population of jaguars (di Bitetti *et al.*, 2003). Given the fragmented nature of the landscape, this signifies that FLR is a fundamental strategy to achieve the UPAF biodiversity vision, ensure a resilient landscape and enable these keystone species to thrive once again.

In parallel, WWF-Brazil initiated an additional ecoregional process in the Serra do Mar ecoregion which is home to the flagship and endangered species, the golden lion tamarin (*Leontopithecus rosalia*). In the first few years, WWF-Brazil's work in the Atlantic Forest prioritised this ecoregion, although it initiated collaboration in the framework of the trinational strategy in the UPAF with WWF-Paraguay and Vida Silvestre. By the middle of the 2000s, collaboration was strengthened across the three offices (Amando de Barros, 2011).

The second phase started in 2010 with a new Atlantic Forest Ecoregion Action Plan (EAP) being produced for three years (July 2010-July 2013). During this phase the focus was on developing best management practices, sustainable forest management, climate change mitigation, protected areas and species protection (the jaguar), as well as developing a strong fundraising strategy.

The third phase (2014-2018) saw the revision once again of the EAP (in 2013) which was extended for five years until 2018. In this phase emphasis was placed on: i) habitat and species protection or recovery; ii) sustainable use of forest resources and responsible production of food and commodities; and iii) legal and financial mechanisms to secure forest protection (Vida Silvestre and WWF, 2017). WWF-Brazil increased efforts in UPAF, specially through funding for a transboundary project along Iguaçu National Park integrating Argentina and Brazil.

Based on the lessons learned from the EAP 2014-2018, a new EAP process took place (Phase IV - 2019-2023). The process promoted adaptive management and stronger engagement among the teams from the countries. During the process, the need for a greater focus on FLR was clear. The current phase has as its vision: *A healthy Atlantic Forest guarantees access to clean water, food, recreation, and a more stable climate for the well-being of all people*. This will be delivered through four strategies: 1. engaging with and raising awareness among society in the Atlantic Forest; 2. promoting sustainable landscapes and restoration; 3. protected and conserved areas; and 4. species conservation.

A NEW ATLANTIC FOREST ECOREGION ACTION PLAN (2019-2023) AIMS TO UPSCALE RESTORATION.

The implementation of these strategies will follow similar approaches as previous EAPs, namely:

1. Protect the large forest blocks that remain, because they represent the only opportunity to preserve the most threatened populations in the long term, as well as the ecological and evolutionary processes that sustain biodiversity;
2. Conserve and integrate smaller forest fragments as elements of functional mosaics and enhance connectivity among the larger fragments;
3. Recover forests on degraded lands and re-establish the ecosystem services for people and biodiversity; and
4. Build sustainable and resilient landscapes that integrate large forest blocks, smaller forest fragments, recovery areas and productive lands, providing connectivity, buffering and proper management of threatened species and the entire biota of the ecoregion.

Quantifiable targets have been set by each office in the current phase:

- WWF-Brazil: By 2023, 1.5 million hectares of vegetation is restored in Brazil.
- WWF-Paraguay: By 2020, 900 ha of forests are undergoing restoration in Paraguay's Atlantic Forest, expanding wildlife riparian corridors by 500 ha, and benefitting 100 local people.
- Vida Silvestre-Argentina: By 2022, 5,000 ha of forest per year start a restoration process in Argentina's Atlantic Forest.

Table 3. Phases of development of the actions over 16 years.

Date	Phases		Related events
	Name	Aims	
1999-2003	**Inception Phase**	Engaging over 70 partners from the three countries to develop the Biodiversity Vision for the Upper Paraná Atlantic Forest ecoregion	**1999.** Establishment of Atlantic Forest office in Puerto Iguazu Misiones (by Fundación Vida Silvestre Argentina (Vida Silvestre)) **2000.** Establishment of the Atlantic Forest Office of WWF in Paraguay
2004-2010	**Phase I:** Biodiversity Vision into practice	Implementation of the Action Plan developed in the Biodiversity Vision. While Brazil focused mainly on conservation, Paraguay focused mostly on protection and restoration, while Argentina focused on native forest management.	**2009.** Launch of the Mata Atlântica Restoration Pact in Brazil to enable the recovery of 15 million hectares by the year 2050 (WWF-Brazil is a member)
2010-2013	**Phase II:** The first Ecoregional Action Plan	The first Ecoregional Action Plan was developed for the Upper Paraná and Serra do Mar ecoregions. WWF-Brazil focused on the Serra do Mar ecoregion in this period. One of the six strategies 'forest restoration' was initiated to recover connectivity in priority places	**2011.** Launch of the Bonn Challenge on FLR
2014-2018	**Phase III:** The second Ecoregional Action Plan	The second Ecoregional Action Plan was developed for the Upper Paraná and Serra do Mar ecoregions. One of the five strategies was 'Best Management Practices' which includes restoration.	**2014.** Launch of the New York Declaration on Forest **2014.** Launch of the Initiative 20x20 (in Lima) **2016.** Vida Silvestre joins the Initiative 20x20
2019-2023	**Phase IV:** The third Ecoregional Action Plan	The third and current Ecoregional Action Plan was developed for the Upper Paraná and Serra do Mar ecoregions. It includes two thematic targets: jaguar and areas with urgent need for restoration which include all the Atlantic Forest in Brazil, Argentina and Paraguay.	**2019.** UN declares the Decade on Ecosystem Restoration 2021-2030 **2019.** WWF joins the Initiative 20x20 **2019.** WWF-Brazil re-integrates the Atlantic Forest Restoration Pact

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IMPLEMENTATION: ACTIVITIES & RESULTS

Most of the activities in the Upper Paraná Atlantic Forest, in all three countries, have revolved around working with land and forest owners given the predominance of private ownership. Policy work has also been important in order to create incentives for private owners to better protect, manage and restore forests, and to generate disincentives for deforestation and forest degradation.

In Argentina, the focal zone was the province of Misiones, and specifically the municipality of Andresito. In Brazil it was in the 13 municipalities around Iguaçu National Park and in Paraguay, the Ñacunday and Pirapo watersheds were prioritised (Figure 2).

Activities (Table 4)

Working with private forest owners

WWF in Paraguay emphasised work with policymakers on the one hand and private landowners on the other. In Argentina Vida Silvestre also centred much of its work on changing landowners' attitudes and behaviours towards the forest by seeking sustainable alternatives to deforestation. Equally, in Brazil, WWF sought means to ensure that restoration could be seen by landowners as a viable option. WWF and Vida Silvestre have supported small private landowners in their effort to conduct restoration on their lands, but also to ensure that they can enhance their livelihoods while doing so. Thus, a focus has been on farming techniques and crops that can be compatible with protecting and restoring forest cover, such as shade grown yerba mate (*Ilex paraguariensis*) or palmito (*Euterpe edulis*).

Cultivation of palmito (*Euterpe edulis*) in Andresito (Argentina) to sell palm hearts.

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To engage local farmers and provide them with alternative income-generating activities that can contribute to valuing the forest, efforts in Argentina for example centred on developing a cooperative for ecoagriculture ('*Cooperativa Agro-Ecológica de Peninsula Andresito*') and promoting sustainable palm heart production. The cooperative was established in June 2004 with a membership of 20 farmers. Activities also included research and identifying options for marketing. A canning factory for heart of palm (palmito *Euterpe edulis*), papaya and pineapple was built in Andresito by the cooperative (in 2006). Also, capacity building on agroecological production of vegetables was developed in 2014 among farmers of Andresito (who were restoring within their lands) and links between these farmers and potential buyers (restaurants and hotels at the touristic city of Iguazu) were established, with successful results. Community wells were also built to improve local access to water both for domestic and agricultural use. In Paraguay support to community nurseries has been provided by WWF-Paraguay, while in Brazil, local landowners were supported with the establishment of agroforestry systems and tree nurseries. Agroforestry courses were also developed to train environmental technicians working in the settlements.

Experimental restoration

Early on, in 2008, in Andresito, Vida Silvestre conducted some experimental restoration applying, monitoring and comparing different treatments and approaches. These were intended to be the basis for scaling up restoration. Methods tested for restoration included enrichment planting, fencing to allow natural regeneration and active planting using 20 native tree species. Species used included the Yellow Poinciana (*Peltophorum dubium*), Angico vermelho (*Parapiptadenia rigida*), Pacara Earpod Tree (*Enterolobium contortisiliquum*) and the Pink Trumpet Tree (*Handroanthus heptaphyllus*). The species were selected with a combination of criteria, such as: availability of seeds/seedlings at the project area, current technical knowledge for the seedling production, environmental conditions, resistance of the species and the interest and preference of each farmer (for the production of firewood, wood and fruit trees). Training on tree planting techniques and on maintenance of reforested plots was provided for local landowners, NGOs and local authorities in 2009-2010. In most cases the areas restored on individual land in Argentina were of between 3 and 5 ha, following either active reforestation techniques or enrichment planting where appropriate.

Experimenting restoration techniques in Andresito (Argentina)

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Propagating native tree species

Payments for ecosystem services (PES) and other market mechanisms

Efforts to better establish links between productive activities and the environment have paid off in the Atlantic Forest. In Iguaçu National Park for example, in 2014, WWF-Brazil engaged with smallholders by bringing them in as suppliers to the local ecotourism concessionaire of the national park, Cataratas. Thus, rather than obtaining produce from far away, the park is now working with local producers, improving their links with the national park and ensuring a local supply chain. In addition, local producers are committed to using better (agro-ecological) practices that are less damaging to the environment. The formalisation of this local cooperative (COAFASO) was concluded in 2011 and it benefits approximately 400 families of local producers.

In Argentina, in Andresito, a project for offsetting three environmental services (water, carbon and biodiversity) was funded by the Dutch lottery (DOEN) in 2011-2013. It has worked with rural landowners to compensate them for their services to protect and restore the watershed of the Tateto/San Francisco stream. Compensation was both in cash and in kind (tools, seedlings etc.). Companies such as HSBC and UPS contributed to this effort. To promote sustainable products in Misiones, a marketing plan was developed, workshops were held to bring in landowners and demonstrate options and train them in agro-ecological practices, and an agro-ecological cooperative was created.

WWF approached individual landowners in Paraguay to look at ways of working with them on restoration, notably by promoting a tradeable rights mechanism. The aim of this scheme is to provide an incentive for the many smallholders who are expected to maintain some forest on their land (according to the law), but without sufficient financial incentive to outweigh the incentive of transforming this forest to other uses.

RESTORING FOREST CONNECTIVITY AND CONSERVING THE JAGUAR GO HAND IN HAND.

Surveying and improving jaguar habitat

Jaguar (*Panthera onca*) is the top predator in the Atlantic Forest and the Upper Paraná holds the southernmost population of this large carnivore (de Angelo *et al.*, 2013). It is an umbrella species with a vast range extending up to 13,000 ha for a male (Morato *et al.*, 2016). As such, efforts to conserve the jaguar have a knock-on effect on many other species and on the habitat in which it lives.

Loss of habitat is the single largest threat to this majestic cat (Morato *et al.*, 2016). Restoring the forest, increasing landscape connectivity and conserving the jaguar go hand in hand.

In the Upper Paraná, surveys have been regularly conducted in the corridor to determine changes in the population of the jaguar. For example, in the period 2006-2007, 47 sampling stations were set up and a survey conducted over an intensive 3-month period. Camera traps were used which also caught on film numerous other species of interest – including jaguar 'competitors' (for prey) such as the ocelot (*Leopardus pardalis*) and puma (*Puma concolor*).

Jaguar is roaming in the Atlantic Forest

Policy work

All three offices have been involved over the years in policy and advocacy work. The aim has been to improve laws, ensure their applicability and support landowners to comply with these laws (see specific section below).

Table 4. Some key activities undertaken (non-exhaustive selection).

	Argentina	Brazil	Paraguay
Phase I 2004-2010 Implementation of first action plan	• Establishment of a cooperative of small producers. • Jaguar surveys. • Forest cover map established as basis for monitoring Andresito landscape. • Experimental restoration. • Passing of Green Corridor Law, creating an area of 1.1 million hectares of conservation and sustainable use in Misiones.	• None (WWF-Brazil focused on the Serra do Mar ecoregion in this first period).	• Promotion of the Zero Deforestation Law. • Development of a Social Pact to Protect, Manage and Restore the Atlantic Forest. • Work on restoration of forest reserves (with 'Tradeable Rights and Conformance of the Forest Legislation' mechanism). • Promotion of the restoration of riverine forest with landowners to protect water courses. • Establishment of several nurseries of native species with municipalities and local communities.
Phase II 2010-2013 The first Ecoregional Action Plan developed for the UPAF	• Implementation of a PES scheme involving reforestation. • Valuation of forest-water linkages. • Establishment of tree nursery. • Work with smallholders for new tree plantings.	• Demonstration units in CanCan Moinho and Lençóis River Basin to serve as models for riparian forest restoration and PES schemes. • Agroforestry courses for environmental technicians working in the settlements. • Support to the Atlantic Forest Restoration Pact with the production of a map of areas eligible for carbon projects.	• Riparian forest restoration. • Securing the by-laws of the new forest law 4241/2010 • Development of business models for forest restoration and REDD+ in 4 pilot areas. • One community nursery established in the municipality of Ñacunday and one municipal nursery in the community of Chacore (combined production capacity of 100,000 seedlings/year).
Phase III 2014-2018 The second Ecoregional Action Plan	• Capacity building on agroecological production with farmers. • Technical support to farmers and 'post-planting' visits and care. • Upgrading natural springs within farmers' land. • Work with a group of women on forest restoration.	• Supporting local landowners with the establishment of agroforestry systems and tree nurseries. • Development of a territorial planning integrated landscape approach tool.	• Extension of 'Zero Deforestation Law'. • Forest enrichment and reforestation in the Rio Ñacunday watershed. • Production of a carbon forest map for the Atlantic Forest of Paraguay.
Phase IV 2019-2023 The third and current Ecoregional Action Plan	• Establishment of a tree nursery at a school in the restoration project area. • Work with smallholders for new tree planting. • Upgrading natural springs within farmers´ land. • Best management practices within the farms. • Work with a group of women on forest restoration.	• Jaguar conservation work. • Promotion of the Trinational network. • Enhancement of the Restoration Pact work in the region. • Development of the plan for restoration of the Paraná corridor area.	• Preparation of seedlings in nurseries with indigenous communities.

Results (Table 5)

Deforestation and degradation

DEFORESTATION AND DEGRADATION CONTINUE ALTHOUGH THE RATE APPEARS TO HAVE SLIGHTLY DECREASED.

Deforestation continues in the UPAF, despite significant efforts in policy changes and application, awareness raising and incentives, although the rate appears to have slightly decreased (5%). Pressures from a growing global demand for agricultural commodities are a major challenge for this region. Underlying drivers include corruption, weak law enforcement and low citizen involvement in controlling the use of the territory.

Data, essentially from Argentina and Brazil, show an annual forest loss of 285,600 ha/year in the period 2010-2014 *versus* 301,800 ha/year between 2005-2009. This represents a 23% decrease in the total area deforested from 2000 to 2014 (Vida Silvestre and WWF, 2017). In Misiones in Argentina, between 2011 and 2014, the annual area deforested was about eight times smaller than at the beginning of the 2000s (Vida Silvestre and WWF, 2017).

In Paraguay the causes of deforestation have changed over the years but have included soy plantation, cattle ranching, encroachment and marijuana plantations inside protected areas. However, degradation continues with unsustainable forest management. Despite ongoing deforestation, it has been estimated that after 10 years of the moratorium in Paraguay, the annual rate of forest loss has fallen by 82% from 120,000 ha in 2002 to 20,000 in 2014.

It is clear that restoring forested landscapes requires a long time. This is even more challenging in areas that are heavily utilised and where anthropogenic pressures, fire and deforestation continue.

Forest fragmentation in the landscape (Paraguay)

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Monitoring forest restoration and tree growth

Restoration efforts

Some restoration results are visible. In both UPAF and the Serra do Mar landscapes, over 5,300 ha of Atlantic forests have been planted in eight watersheds since 2006 with WWF support. In Andresito alone (Argentina), over the 10-year period (2008-2018) a total of 97,000 seedlings of 40 different native species were planted over an area of 225 ha. Between 2003-2019, WWF-Paraguay contributed to a total of almost 15,000 ha being restored in the UPAF (both planting and natural regeneration).

Restoration efforts by ITAIPU Binacional, here in Alto Paraná, Mbaracayu municipality (Paraguay).

Under the 'Itaipú Preserva' programme, ITAIPU planted more than 3 million native trees between 2015 and 2019, restoring over 2,600 ha.

ITAIPU is a Brazilian/ Paraguayan hydroelectricity company situated on the Paraná River. The company is committed to protecting and restoring the Atlantic Forest, with technical support from WWF-Paraguay. In Brazil, Itaipú has been implementing the Santa Maria corridor, an area connecting Iguaçu National Park and Itaipú's private protected area.

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Policy

Changes in policy and in policy implementation have been particularly successful in Paraguay. The rate of deforestation, since the Zero Deforestation Law (extended several times with WWF support) was first enacted in 2004, has decreased between 82 to 95% since the baseline in 2003. However, since the promulgation of the zero deforestation law, close to 250,000 hectares have been cleared illegally due to impunity and lack of accountability of public entities. The establishment of Paraguay's national PES mechanism in 2006 was equally important as a governance mechanism to transition from the moratorium. But even though the tool has been enacted, until today this mechanism has a low implementation rate and PES schemes remain to be established as an incentive to halt deforestation.

In Argentina, the National Law 26.432 (ex 25.080/1999) was promulgated in 2008 regarding investments for cultivated forests and in 2007 the National Law 26.331 that establishes the minimum environmental protection budgets for the enrichment, restoration, conservation, exploitation and sustainable management of native forests. Both laws grant subsidies for forest restoration in farmland.


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Land owner signing an agreement for environmental services in Andresito (Argentina)

FLR Marketing incentives

The application of market mechanisms has been a useful tool to promote restoration in all three countries. In Argentina, on the one hand, compensation for environmental services has functioned well, with more than 30 local producers reforesting 100 hectares in priority areas of Andresito Municipality. On the other hand, the creation of new markets for products from Andresito has enabled farmers to adopt environmentally friendly activities that are generating an income to local producers until today. On a larger scale, hydroelectricity companies are investing in restoration. Itaipú Binacional for example, is protecting its reservoir by maintaining (conserving and restoring) over 100,000 hectares of forests.

Biodiversity

Surveys have shown a 160% increase in jaguar numbers between 2005-2018. This can be attributed in part to improved connectivity in their habitat. Protected area management has also been reinforced as protected areas remain a cornerstone of conservation in the UPAF.

New Generation Plantations

WWF collaborates with companies via the 'New Generation Plantations' (NGP) platform. This is a way of ensuring that plantation companies can meet their production objectives while minimising their impact on the natural forest and instead adding value to existing forest fragments. The NGP programme launched by WWF in 2007 recognises that well managed forest plantations have a role to play in preserving biodiversity while meeting human needs, contributing to sustainable economic growth and locally sustainable development. They also help to reduce the impact that a growing demand for timber products places on natural forests. The NGP process acknowledges the importance of engaging stakeholders and seeks to support projects led by local indigenous communities.

In Brazil, participants in the NGP manage an area greater than 2 million hectares (FSC certified). In areas that are not too degraded, set aside areas are allowed to regenerate naturally, while in the more degraded sites companies actively replant the native forest.

Several companies in the Atlantic Forest, such as Veracel and Suzano, have committed to the NGP programme and are setting aside areas that have high conservation value as well as restoring areas.

Table 5. Some key results.

Type	Key performance indicators	Results
Reducing forest loss	Decrease in intensity of forest loss in UPAF (%) (from 301,800 ha in the 2005-2009 period to 285,600 ha in 2010-2014)	5.4%
	Reduction in annual forest loss in Paraguay since 2002	82%
	Decline in deforestation rate in Brazil between Oct. 2017 and Apr. 2018 (SOS Mata Atlantica & INPE, 2019)	9.3%
	Decline in deforestation rate in Argentina between 2007 and 2017 (UMSEF MAyDS, 2018)	65%
Restoration	Area (ha) under restoration in UPAF and the Serra do Mar landscapes between 2000 and 2015 (Vida Silvestre & WWF, 2017)	Over 5,300 ha
	Area (ha) restored (both actively and passively) in Paraguay with landowners since 2003	Almost 15,000 ha
	Area (ha) restored (planted) in Andresito (Argentina) between 2008 and 2018	225 ha
	Number of native species used for restoration in Argentina	40
Biodiversity	Increase in the populations of jaguars in the Upper Paraná forest of Brazil and Argentina (from 2005-2018) (measured through camera trap surveys)	160% (from 40 to 105 individuals)
Water	Metres of water distribution system developed in Andresito	21,200 m
	Number of natural springs upgraded (by 2017) in Andresito	28

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PARTNERS AND MAIN ACTORS

In the Upper Paraná, WWF and Vida Silvestre have collaborated with public and private sector entities at all levels: national, ecoregional, landscape and local levels. Acknowledging that this landscape is heavily modified and continues to be exploited, has meant an urgency to collaborate with diverse actors and ensure that they can all benefit from, and play a role in, the restoration of this unique biome.

COLLABORATING WITH DIVERSE ACTORS ENSURES THAT THEY CAN ALL BENEFIT AND PLAY A ROLE IN RESTORATION.

Argentina

WWF's partner organisation, Fundación Vida Silvestre Argentina, has taken the lead on activities in Argentina. It has collaborated with the government at municipal and provincial levels. These local government entities have been important for facilitating Vida Silvestre´s work in the project area through funding for finishing the canning factory for heart of palm (palmito), papaya and pineapple (provincial government) and logistical support in the field (municipal government). Representatives of the national parks, and provincial park guards were also engaged, particularly as concerns work related to the conservation of the jaguar. Vida Silvestre has worked closely with local producers and landowners who are the key targets for the restoration work given that critical forest corridors lie on private land. Much of the collaboration has been with cooperatives of local producers that were set up under the project.

Collaboration with the local government has also been important, for example the Andresito City Council was the main partner in the compensation for environmental services scheme implemented during 2011-2013, and it helped by bringing in the support of new partners in the project area.

Early on in the ecoregional work a network of social and environmental organisations was established in Misiones - the Environmental Observatory for the Misiones Forest (Observatorio Ambiental para la Selva Misionera) – intended to promote the Green Corridor Law. About 10 of the local NGOs working with Vida Silvestre on development of the Misiones Green Corridor have been engaged in this work. However, as the fund that was supposed to be created to implement sustainable activities within the green corridor failed to materialise, this network has now dissolved.

Paraguay

Indigenous communities have been target groups in many of the projects being carried out under this overall programme in Paraguay. In the Ñacunday watershed, the Aché indigenous communities of Puerto Barra who own 821 hectares were brought in as beneficiaries of projects for enrichment of their native forest.

WWF has collaborated with several national and local public entities. At the highest level, WWF-Paraguay has been actively involved with the Attorney General's office, the Secretary of the Environment and the National Forestry Institute to develop a system of Tradeable Development Rights (TDR) that allows improved implementation of Law 422 on compliance with forest reserves. A TDR mechanism is a type of conservation easement whereby a producer/farmer owning land in a non-priority conservation area can develop all of his/her land by purchasing conservation rights from landowners in priority conservation areas. Under such a system, landowners residing in priority conservation areas gain economic benefit by maintaining and/or restoring their lands to forest, and landowners residing in non-priority conservation areas comply with environmental legislation that limits land development by investing in these priority areas.

© Deutsche Welle

Aché indigenous communities (Paraguay)

At the local level, WWF has also provided GIS training to local authorities in the municipalities of Pirapó, Santa Rita, Naranjal and Santa Rosa del Monday in Paraguay. It was important to carry out this work in close liaison with the local municipalities in order to receive key land information (i.e. to calculate liabilities) and to gain the trust of local landowners who are very wary of national authorities. WWF also partnered with NGOs, cooperatives, Itaipú Hydroelectric Dam and private property owners to pilot reforestation/agroforestry methods, the PES certification scheme and other sustainable forest management models.

Brazil

THE PACT IS ONE OF THE FIRST BRAZILIAN RESTORATION NETWORK TO MONITOR COMMITMENTS TO THE BONN CHALLENGE AND PARIS AGREEMENT.

Several WWF partners have adopted the UPAF vision and have been active in Brazil. For example, the hydroelectricity company Itaipu-Brazil was one of the main restoration implementers in the UPAF, especially in riparian areas and in Santa Maria´s corridor, an area connecting Iguaçu National Park and Itaipú's private protected area. These partners have been inspired by the UPAF vision and particularly its objectives to protect and restore this biodiversity corridor.

WWF-Brazil also engaged in the UPAF in formal partnerships with the Chico Mendes institute (ICMBio), SEMA (the Paraná State Government) and cities in the buffer zone of the Iguaçu National Park. The aim has been to introduce the design, planning, monitoring and evaluation of PES-based activities in the management of the Iguaçu National Park, incorporating best practices developed in other cross-boundary protected areas and to promote their adoption among communities in the park's surrounding areas. This collaboration supported the consolidation of the landscape of the Atlantic Forest in the trinational biodiversity ecological corridor with a view to engage counterparts in Argentina and Paraguay in future conservation efforts.

A partnership with the Brazilian Atlantic Forest Restoration Pact was established, aimed at strengthening the Pact and promoting a trinational vision for restoration of the biome.

The Pact is one of the first Brazilian restoration network to monitor an international restoration commitment (the Bonn Challenge and the Paris Agreement) and to demonstrate that ambitious targets can be reached.

A trinational workshop was co-organised in Foz de Iguaçu by WWF-Brazil, WWF-Paraguay, Vida Silvestre, Brazilian Atlantic Forest Restoration Pact, Centro de Pesquisas Ambientais do Nordeste (Cepan), Itaipú, Ecosia and Mater Natura to identify the challenges and opportunities for a trinational restoration network. A webinar presented all the results and synergies to advance on a trinational pact to promote restoration of the Atlantic Forest. Through the mobilisation of a network of stakeholders from Brazil, Argentina and Paraguay, the cooperation seeks to identify priority areas, share lessons, devise governance mechanisms, promote public policies, monitoring and the development of integrated projects in the Upper Paraná Ecoregion. This initiative is led by WWF-Brazil and has a trinational scope.

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Restoration field visit - Iguaçu National Park in Foz de Iguaçu (Brazil) - during trinational workshop in October 2019.

CAPACITY BUILDING

Capacity building has been, and continues to be, an important component of all interventions since the start of the work in UPAF. It has targeted local communities and individual farmers, but also larger institutions and the wider public. Research into the forest ecosystem, and specifically with a focus on restoration, has also been important.

Restoration knowledge

Capacity building has focused on improving knowledge about ways of carrying out restoration in the Atlantic Forest, as well as improving understanding of the ecosystem. A toolkit was produced in 2010 on restoration methods in Andresito (Argentina). It is entitled '*Buenas prácticas para la restauración forestal nativa a pequeña escala en la provincia de Misiones*' (Best Practices for Small-Scale Forest Restoration with Native Species in the Misiones Province). Knowledge exchange activities took place between local farmers and technicians from Brazil's Capanema and Argentina's Andresito municipalities.

In Paraguay there is very limited capacity concerning native seedling species. When WWF-Paraguay started the FLR programme it supported the construction of nurseries of native species with a strong capacity building programme in several localities. In 2014, together with UNIQUE (with support from the German agencies DEG and KfW), WWF-Paraguay published a catalogue of management options for its Atlantic Forest that included for example, mixed species plantations and enrichment planting (UNIQUE, 2014).

At the UPAF level, the trinational restoration network currently being created will promote knowledge exchange.

Research

IMPROVED KNOWLEDGE EMERGING FROM RESEARCH IN BOTH THE ENVIRONMENTAL AND SOCIAL SCIENCES, HAS BEEN CRUCIAL.

Given the importance of the Atlantic Forest and the threats it has faced over the years, significant research has been carried out, particularly in Brazil (e.g. Brancalion *et al.*, 2012; 2013; 2014; Crouzeilles *et al.*, 2020). Research seeking to better understand the opportunities for restoration, the cost of restoration and ways of measuring landowners' relationships with the forest and restoration, has all provided evidence for improved conservation actions on the ground.

In WWF work, applied research is sometimes required prior to action. Several surveys have been carried out over the years. For example, in Andresito (Argentina) in 2003, surveys of 17 properties were carried out and each landowner was provided with a report of the survey notably outlining the state of the palms, the amount, their size and their distribution. This provided a basis for future management and the design of guidelines.

More fundamental research has been important in the landscape. In Argentina, the 'Centro de Investigaciones del Bosque Atlantico' (CeIBA) was established in 2005 as an NGO with the aim to improve knowledge on the ecology, conservation and sustainable use of the Atlantic Forest. It has hosted several researchers and students over the years with research topics as varied as the ecology of the forest, ethnobotany, animal behaviour, fragmentation impacts, etc. All of the research results provide a solid knowledge base for restoration, conservation and sustainable management of the UPAF. The Urugua-í Biological Station in the eponymous private reserve, provides research and training facilities inside the Atlantic Forest for students and researchers.

In Brazil, social sciences have been developed too. Four stakeholder workshops and several meetings were held and interviews were conducted to better understand the main drivers of forest degradation, identify opportunities for restoration and to improve governance. WWF-Brazil's science programme developed an integrated landscape planning tool to prioritise sites for protection and restoration.

In Paraguay, research in the last decade has advanced considerably and has highlighted the necessity to protect the native forest, notably for the services it provides.

WWF in Paraguay has also supported the company Paraguay-Sylvis to test the growth of some native species that can compete with Eucalyptus and other rapid growth species. Even though Eucalyptus still grows much faster than the native species Kurupa´y (*Anadenanthera colubrina*) and Petereby (*Cordia trichotoma*), these species are good alternatives with relatively rapid growth rates.

Environmental education

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Second meeting of the programme "Women working for forest conservation" in 2019 in Argentina.

Environmental education was also an important component of WWF's and Vida Silvestre's activities. In 2005, for example, four full day events were carried out in the private reserve of Yacutinga, attended by 100 students from four schools in Andresito (Argentina). More generally, environmental education activities have been carried out regularly in rural schools of the area. Also, in 2013, Vida Silvestre partnered with the Ministry of Education of Misiones Province to print and distribute environmental education kits, including on jaguar conservation.

Emphasising the importance of gender, Vida Silvestre has been conducting workshops since 2018 entitled 'Women working for forest conservation' which bring together Vida Silvestre staff and women working on Vida Silvestre projects.

WWF and Vida Silvestre placed great emphasis on a combined communications and education campaign to raise awareness. In each restoration project and programme, a communications toolkit was prepared for multiple audiences: schools, communities and landowners. Youth groups were an important target audience, with several training sessions on nurseries, plantations and restoration campaigns.

In 2008 WWF-Paraguay created a campaign called 'Let's restore the Atlantic Forest', bringing together several influencers of different areas of expertise to develop TV and radio spots for the general public. A new NGO called '*A Todo Pulmon Paraguay Respira – ATP*' was created in Paraguay. WWF supported ATP to build its capacity in fundraising, geographical information systems and restoration. This NGO has become very successful and to this day WWF-Paraguay and ATP continue their collaboration on restoration programmes.

COMMUNICATIONS

For WWF and Vida Silvestre, communications has been an important component of the Upper Paraná programme of work, through different means, including campaigning, events and publications.

Campaigning

In Argentina for example, a communication strategy was developed and launched in 2007 to engage decision-makers and the public in jaguar conservation. A total of 330 people attended the campaign launch in Misiones in May 2007. The campaign included TV and radio spots broadcasted on provincial TV and radio stations. Merchandising has helped to support the campaign. It also included a province-wide school contest on jaguars and the creation of a campaign website. Vida Silvestre successfully brought on board a total of 59 radio stations and 20 TV stations to support the jaguar conservation initiative by emitting information for free.

© E. Salvador

Claudia Amicone interviewed.

Recently in Paraguay (2017-2018), two communication campaigns were launched via the television and radio. Their focus was on the impacts of deforestation. Several You Tube clips have also been released (see for example: 'A country after the rain' and 'Upper Paraná Atlantic Forest: In Danger of Extinction').

In Paraguay, a survey of 178 stakeholders in the Upper Paraná demonstrated that in part thanks to communications efforts, the percent of people who knew about the Upper Paraná Atlantic Forest rose from 17.5% in 2012 to 28.1% in 2015. Radio and TV were the two main media providing information to those surveyed. Nevertheless, in the same district, the number of people who felt that they could see a positive change in restoration dropped from 65% in 2012 to 56% in 2015.

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Planting campaign

Special events

Several special events, of local to global importance, were held during the last 16 years. Here we include some recent examples of regional, national and global importance:

- In 2019, the first meeting of the Trinational network for restoration was held.
- In 2019 WWF-Paraguay partnered with FECOPROT (Federación de Cooperativas de la Producción) to promote the restoration of riverine forest with the Indigenous commu-

nity Mbya in the Department of San Pedro. This support includes the establishment of nurseries of native species and training workshops on restoration techniques.

- In 2018, Vida Silvestre participated in the annual agriculture fair to reach its target audience (farmers) and promote restoration on their land. Printed material was also produced to raise awareness among inhabitants. For example, six articles were published in the local and provincial newspapers in Andresito.
- In 2017, WWF-Brazil in partnership with Impact HUB, the Brazilian Support Service for Micro and Small Businesses (SEBRAE), the Ministry of Environment and the Atlantic Forest Restoration Pact, launched an 'Environmental Challenge' on innovation and entrepreneurship in forest restoration. The aim was to recognise projects that make a significant contribution to restoration. The Challenge sought to map, connect, drive forward and reward initiatives that restore Brazilian biomes using innovating and sustainable models. The clip 'The Atlantic forest trail' was released on YouTube in 2018.

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WWF Annual Conference in 2014, gathering WWF's CEOs from more than 90 countries.

- In Paraguay, since the creation of ATP in 2009, with the support of WWF and other partners, this NGO has developed several campaigns on restoration, always with the purpose to connect forest blocks and to raise awareness about restoration in the Atlantic Forest.
- In 2014, the WWF Annual Conference, gathering WWF's CEOs from more than 90 countries, was held in Iguazu Falls. It brought the spotlight to this region with several articles published around that time.

Publications

Vida Silvestre, in partnership with the Ministry of Education of Misiones Province published and distributed environmental education kits in 2013. In 2016, Vida Silvestre released the booklet 'Prácticas Amigables con el Agua' ('Water Friendly Practices') listing best management practices regarding water use and conservation within rural areas. Short clips for the web were designed, for example on reforestation in Misiones.

In Brazil, in 2004 a booklet entitled 'Atlantic Forest – The forest we live in' aimed to describe to the general public basic facts about the Atlantic Forest. Over the years in Brazil, the Atlantic Forest Programme has published 84 articles in 69 different newspapers and websites.

The 'Biodiversity Vision of the Upper Paraná Atlantic Forest Ecoregion' published in 2003 (di Bitetti *et al.*, 2003) has been a landmark document, used to this day.

In 2017, WWF and Vida Silvestre published a 148 pages report "State of the Atlantic Forest: Three Countries,148 Million People, One of the Richest Forests on Earth".

GOVERNANCE

Governance challenges differ greatly in all three countries. For this reason, it is important to understand the historical context of the region. Despite some national differences, some broad areas can be described for the three countries as being important governance issues that the programme has had to contend with and address where possible.

Tenure

Inequality of tenure has been a significant challenge and source of conflict in the region (e.g. Mansourian *et al.*, 2014). Concentration of land, particularly more productive land, in the hands of a few powerful owners is omnipresent. For example, in Misiones, 93% of producers have properties under 100 ha, within just 1/3 of the productive land (Colcombet and Noseda, 2000). The same can be seen in Paraguay where 1% of landowners own 77% of the area with properties over 1,000 ha (Global Investment Center, 2015). And the same can be seen in Brazil. One of the results has been encroachment by landless farmers and deforestation. The large landowners are more likely to engage in large scale conversion to agriculture, while smallholders may be more open to restoration but represent small, fragmented areas. At the same time, large landowners may be more open to using mechanisms such as payments for ecosystem services.

Policies

The second important area to consider in governance is the policy environment and its support to conservation and restoration.

© WWF-Paraguay

Meeting of the Social Pact for the Conservation of the Atlantic Forest of 2005

In Paraguay, policy work was a crucial component of WWF's activities. The Forest Conversion Moratorium or Zero Deforestation Law approved in 2004, has been a cornerstone of WWF-Paraguay's work in the Upper Paraná. By imposing a temporary ban on further conversion of native forest in Paraguay, it has enabled an 82-95% reduction in annual forest loss between 2002 and 2014 (Vida Silvestre and WWF, 2017). Renewed several times, it continues to this day. WWF has worked closely with the government to support implementation of this law.

The Law 3001/06 Value and Retribution of Environmental Services was promulgated in 2006. It favours conservation and sustainable development of the environment by justly and adequately valuing environmental services. This law finances the protection of 'additional' forest reserves by a property owner who has more than 25% forest reserves. It was created to accompany Law 2524/4 and to aid with the distribution of economic alternatives offered for environmental conservation.

WWF has also been working closely with the Paraguayan Government to pilot 'tradeable rights' (modelled on carbon credits) whereby landowners not wanting or able to restore their own land, may instead finance restoration of forest elsewhere. Legislation had to be enacted to promote such a scheme and WWF-Paraguay has worked closely with the government to that end.

Finally, the informal Social Pact for the Conservation of the Atlantic Forest of 2005 was transformed into the 'Conformance with Forest Law (CFL) programme' which aligns

with the Paraguayan Forest Code of 1972 (Law N° 422). It requires that landowners with over 20 hectares must retain 25% of the land under forest and that 100 metres either side of watercourses should be forested (under the bylaws of the 2012 forest law 4241/ 2010).

In Argentina, the Green Corridor Law in Misiones passed in 2000 provided an important backdrop to Vida Silvestre's work in the municipality of Andresito. Under this law, an area of 1,200,000 ha within the province of Misiones was to be zoned and become effectively a 'green corridor' connecting the existing core forest areas. Implementation of this law has been the focus of Vida Silvestre's work in the region. Also, the National Law for Native Forests Protection passed in 2007, supported Vida Silvestre's work by prohibiting conversion in 73% of the remaining forests. The remaining 27% of forest was categorised as 'green' (according to the national law 26.432), which is the category that groups sectors of low conservation value that can be partially or completely transformed.

TODAY, THE LEGAL ENVIRONMENT BETTER SUPPORTS CONSERVATION AND RESTORATION.

In all three countries, laws exist requiring a protective strip of forest cover along water courses (with the required distance varying from 5-30 metres). The size of the riparian areas to protect, depends on the size of the water course and is regulated by law number 4241/2010 in Paraguay, law number 26.331 in Argentina and law number 12651/2012 in Brazil. These have often not been respected, and WWF and Vida Silvestre have been collaborating with landowners and local authorities in the Upper Paraná to find viable means to restore forest cover along watercourses on private land. The benefits of such restoration extend beyond increasing forest cover, as the riparian forests contribute notably to freshwater conservation, protecting water courses from sediment, maintaining water temperature and providing a corridor in which a diversity of faunal species can seek cover, move and feed.

Informal decision-making measures

In Brazil, WWF's policy work has centred on social movements and mobilisation in support of or against specific policies. For example, in 2013 WWF-Brazil gathered a group of organisations under the banner of the Forest Code Watch Initiative to oppose implementation of new legislation perceived to weaken forest protection. The creation of an online platform helped to facilitate access to information on the forest code, as well as encouraging the debate about its correct enforcement. Also, the Pacto pela Restauraçao Mata Atlantica (Atlantic Forest Restoration Pact) officially launched in 2009, mobilises over 250 partners around conservation of the Atlantic Forest. The Pact is coordinated by a governing board made up of 20 members and has six working groups to tackle specific issues (e.g. a technical and scientific group or a policy group) (Brancalion *et al.*, 2013). Its objective is to restore 15 million ha by 2050. WWF-Brazil supported the Pact concretely in 2012 through mapping of carbon stocks to determine potential areas for restoration. The organisation is currently supporting the Pact's work and is promoting discussions for its extension to Argentina and Paraguay. It encourages the implementation of its goals and its technical groups, capacity building of Pact's regional units and the design of integrated projects and monitoring. At the same time a Trinational restoration network is being created.

In Paraguay, a stakeholder coalition initiative, called the 'Social Pact for the Conservation of the Atlantic Forest' was led by the Vice-president of the Republic and the UNDP, and organised and facilitated by WWF. By August 2005, 139 organisations had signed up to the pact. It was an attempt to bring multiple interested parties together to identify a viable means of ensuring the survival of the Upper Paraná Atlantic Forest, notably by each making commitments under the pact and by agreeing and putting in place effective sanctions, given existing legal shortcomings. Its goal was

'*combining willpower for the conservation and sustainable development of the Upper Paraná Atlantic forest*'. This pact was eventually transformed into the 'Conformance with Forest Law (CFL) programme' which aligns with the Paraguayan Forest Code of 1973 (Law N° 422). However, because Law 422 has not been updated, confusion has grown concerning the necessity of restoring the environmental shortfall in the Forest Reserves with native plants. Although several NGOs have requested enforcement of the law, lack of clarity on the implementation procedure remains.

Linking Upper Paraná to global commitments

The international non-binding 'Bonn Challenge' has been enthusiastically adhered to by the three countries. In 2015 Argentina committed to restore one million ha by 2020. Brazil, under the regional arm of the Challenge – the Initiative 20x20 (established in 2014) – committed to have 22 million ha (nationwide) under restoration by 2030, of which 0.3 million in São Paulo State and 0.08 million ha in the state of Espírito Santo, both of which encompass the Atlantic Forest. Importantly, in Brazil the commitment was made by both the Ministry of Agriculture (10 million ha) to restore degraded pasture area and low carbon agriculture; and the Ministry of the Environment for restoration and reforestation (12 million ha). Paraguay has not yet made a commitment, although has signalled that it plans to do so.

INTERNATIONAL COMMITMENTS SIGNED BY THE THREE COUNTRIES PROVIDE AN IMPORTANT STIMULUS.

Under the 2015 Paris Agreement, Brazil's nationally-determined contribution (NDC) also refers to a similar amount "*restoring and reforesting 12 million hectares of forests by 2030, for multiple purposes*" (Government of Brazil, 2016). Reforestation is also part of Paraguay's NDC (Government of Paraguay, 2016).

In 2017, Brazil created the National Policy for restoration of native vegetation, based on the National Plan for Restoration (decree n° 8.972/2017) that identified the main challenges and barriers for the implementation of restoration.

In 2017, Argentina launched its National Restoration Plan ('*Plan Nacional de Restauración de los Bosques Nativos*') with the aim to promote ecological restoration, recovery and rehabilitation of native forest. It is inserted in the political context of global objectives on climate mitigation and adaptation and sustainable development (UNCCD website).

No doubt these commitments will be important for the Upper Paraná and will be a contribution from the three countries to the UN Decade on Ecosystem Restoration (2021-2030). They provide an important stimulus for local action.

SUSTAINABILITY

New funding tools were tested over the years, such as payments for ecosystem services. However, the programme has relied on national and international donor funding throughout different projects which, in the long term, is not a financially viable model. Having said that, several factors may be said to contribute to the programme's sustainability. Four aspects of sustainability are explored: 1. financial sustainability; 2. human resources; 3. institutionalisation; 4. WWF's position toward a hand over strategy.

Financial sustainability

First, in terms of economic valuation, a study in Paraguay (2018) found that 1,396 hectares of native reforested area within Itaipú's buffer area is worth over USD 4 million because of the carbon it holds - if it is certified and sold in the voluntary carbon market. That amounts to approximately USD 2,865 per ha. Recognising the multiple benefits of trees however, one can imagine an even higher amount by factoring in other benefits such as the value of trees for biodiversity, water, soils etc.

Second, the cost of restoration through tree planting was estimated in 2010 in Argentina's Andresito, at USD 4,270 per hectare. More recent estimates place this amount at USD 1,500-2,400 per ha. Although reduced, these amounts remain high. Nevertheless, they should be placed in the context of the values generated (as per the preceding example for Paraguay). In Brazil, Brancalion *et al.* (2012) estimated the restoration cost per ha to be closer to USD 5,000.

Third, new funding tools were tested over the years. The Upper Paraná programme has sought to pay for itself through trialling payments for ecosystem services schemes as well as the trading permit scheme in Paraguay. The PES scheme in Paraguay is now funded by private property owners (that have not maintained their forest reserve) buying certificates. In addition, funding is channelled through a 1% reserve of the budget of all approved public work projects with an environmental impact, administered by the Ministry of Public Works & Communications. Also in Paraguay, WWF has supported the identification of approaches to implement REDD+. In Argentina, an increase in the interest of private companies to offset their carbon footprint through financing restoration actions can be observed. At the national level the forest law (26.331/2007) would allow for funds if it were fully implemented. Vida Silvestre continues to work so that this could happen. In Brazil, pulp and paper companies have also provided funding for restoration.

Table 6. Approximate budget invested by WWF for the Upper Paraná between 2003 and 2019.

	Approximate budget for 2003-2019 (USD)
Argentina	1,400,000
Paraguay	2,940,000
Brazil	2,400,000
Total	**6,740,000**

However, **classic funding sources** remain the default as the programme continues to depend on donor funding(Table 6). Major donors have included USAID, DIFID-UK, WWF-Netherlands, WWF-Switzerland, WWF US, WWF International, the Inter-American Development Bank (US), the Fundación Eroski (Spain), the Spanish International Cooperation Agency (AECI), through the Generalitat Valenciana, the British Embassy in Argentina, the Döen Foundation, the Ecosystem Alliance; three corporations (HSBC, J&J and UPS), IUCN-Netherlands and the UNDP - Small Grants Programme.

Human resources

Each WWF office had a project lead for the UPAF, dedicated to a large extent to the restoration component. Collaboration with local communities and other local associations (e.g. the 'Cooperativa Agro-Ecológica de Peninsula Andresito' in Argentina) and NGOs (e.g. SOS Mata Atlantica in Brazil) has also been important.

In Brazil, WWF-Brazil focused on the Serra do Mar ecoregion in a first instance because that is where there were already strong local partners such as the NGO Associação Mico Leão Dourado in Rio de Janeiro and São Paulo Secretary of Environment/ State park agency and and also funding was more readily available. Furthermore the organisation has no office in the State of Paraná, whereas Vida Silvestre is present in the ecoregion, as is WWF-Paraguay. Thus, relying on strong local partners allowed WWF-Brazil to engage in both ecoregions, to different extents in a first instance, based on available human and financial resources.

Institutional and human capacity

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Human qualities are necessary for project staff to be able to engage effectively with local stakeholders, here in Paraguay.

By working with and through numerous local institutions, cooperatives, authorities and other partners, WWF and Vida Silvestre have solidly anchored FLR in the Upper Paraná. In Andresito, for example, Vida Silvestre supported local associations making it very clear from the start that this support was limited in time. The aim was to provide an impetus to the associations, help them improve their knowledge, develop their capacity so that they could continue without external support. Indeed by 2008, and only after four years the agro-ecological cooperative decided to part ways with Vida Silvestre.

WWF's position toward a hand over strategy

The development of the WWF-led ecoregion vision in 2003 has included numerous actors. It has been endorsed and promoted by these different actors, who have designed their own projects in alignment with this vision. It is a significant strength of the process that 16 years later, these and newer actors are still operating with this vision as their fundamental framework. While WWF is still active in the Upper Paraná, and was active in the field throughout this period at least in Argentina and Paraguay, it is far from being the only actor. Its main transboundary legacy is already apparent via adoption of the vision by others.

Many actions are still ongoing until 2023. However, results are far from secured. Despite political will, deforestation continues albeit at a slower rate. Several actors are mobilised in all three countries and the restoration challenge has been prioritised by many in Brazil in particular. WWF will continue to maintain its activities in this region at least until 2023 when the next ecoregion action plan finishes. After that, the organisation will have to decide how best to position itself in the long term vis-à-vis the many actors in the region and how to add value to the processes launched already 16 years ago for an entire ecoregion.

OVERARCHING LESSONS LEARNT

Implementing FLR in this complex transboundary context has generated many valuable lessons. Reflecting on the entire period since the ecoregion vision was defined in 2003, provides interesting hindsight on many aspects. Key lessons for FLR emerging from this long-term programme are:

1 Lasting convening power of ecoregional planning

Ecoregional planning provides a platform for convening multiple partners to reach one common biodiversity vision.

In the Upper Paraná, this process under WWF's leadership and with the participation of a wide group of strategic stakeholders, was launched at the end of the 20th century. While it took several years to carry out the necessary research to design and agree a common vision for the ecoregion, it remains to this day a guiding document and one that several other organisations and entities are using to define their work, including FLR.

2 Transboundary FLR planning can be effective for conservation, but implementation is always decided at the national and local levels

Differing national and local social, political and economic contexts render transboundary FLR initiatives more complex. Large-scale interventions such as FLR, may require improved collaboration across countries in planning and defining priorities. However, the reality is that on the ground activities will need to be decided and implemented at the local and/or national level together with local stakeholders.

In the Upper Paraná, national priorities and opportunities often determined implementation and a snowball effect occurred, as one national project led to another. As a result, at some stage the coherence of the three country strategies may have been reduced, however, today it has been re-energised and builds on solid and complementary experiences.

3 Implementation at multiple scales

Local, national, regional and even international actions can all contribute to an FLR initiative.

For example, in the Upper Paraná, WWF and Vida Silvestre have worked with their national governments to improve legislation, whilst also working locally with small landowners and communities.

4 Restoration is one of many interventions in a landscape

Restoration takes place within a landscape within which there are many other priorities, interventions, projects and interests. FLR can complement other actions, such as jaguar conservation, but may also compete in some cases. Thus, promoting the convening power of the landscape approach (the 'L' of FLR) may prove delicate.

In the Upper Paraná, strong commercial interests continue to put pressure on the forest, and the success of FLR implementation will depend on its ability to reduce this pressure through for example, improved policies, enforcement, certification schemes and economic alternatives of non-timber forest products.

5 Addressing the underlying drivers of deforestation is an essential part of FLR

Drivers of deforestation are complex, and multi-scalar (e.g. related to international markets) but tackling them is central to a comprehensive FLR strategy.

In the Upper Paraná, each country faces different underlying drivers, but a common one is the massive expansion of lucrative agricultural crops and pastureland in response to growing global demand (soya, meat).

6 Diverse and innovative restoration strategies are needed in the context of ongoing deforestation

Investing in long term restoration efforts in a landscape where deforestation is still occurring, and where newly 'restored' areas risk deforestation, requires specific tactics.

In the Upper Paraná, although decreasing, annual deforestation still exceeds restoration efforts. All 'restored' areas are still young and unable to exhibit all the ecological qualities necessary to deliver ecological and social benefits. Specific protection or long-term commitments by landowners are needed. A multi-pronged approach, that includes demonstration sites that can inspire, as well as a focus on quality and not just quantity, are important milestones on the way to FLR. In Paraguay, limited capacity exists for restoring with native species and all too often, eucalyptus species are used in reforestation rather than native species.

7 Social movements, networks, partnerships, alliances and stakeholder platforms play a mobilising and multiplier role for FLR

Through these informal and formal groups, FLR may be promoted and replicated more rapidly across a region or country.

For example, in Brazil the Atlantic Forest Restoration Pact has been a successful means of harnessing the energy, power and resources of several hundred actors. This is all the more important in difficult or even hostile political contexts. Today, a trinational UPAF restoration network is being considered among the three countries and first steps are being developed.

8 Permanent dialogue helps to maintain momentum and establish trust

It is important for the proponents of FLR (and other large-scale conservation efforts) to be present locally and maintain open communication channels with all stakeholders, to understand their needs and priorities and to establish trust.

In the Upper Paraná, co-designing FLR projects together with local stakeholders, has helped to recognise and address their needs and interests, and has also informed field teams on how to successfully implement FLR.

9 Strong civil society organisations are required

Capacity of civil society organisations on the ground often needs to be strengthened. To upscale FLR it is necessary to count on empowered local actors.

In Argentina, Vida Silvestre has had to take the lead on many local actions because of a lack of strong local organisations in Misiones, while in Brazil, WWF has been able to rely on strong local partners for implementation. In Paraguay, communities are dependent on WWF because of a lack of capacity.

10 Human qualities of project staff are decisive

Patience, understanding, humility and respect are some of the key qualities necessary for project staff to be able to engage effectively with local stakeholders to achieve the considerable and long-term changes required for FLR.

In the Upper Paraná, local implementation teams combine multiple skills and qualities – including negotiation skills and the ability to relate to local smallholders – to produce effective FLR results.

11 Inclusive implementation of FLR must recognise social realities

Local stakeholders have rights and responsibilities in the framework of FLR which need to be recognised. In particular the multiple roles played by women are crucial in rural areas.

In the Upper Paraná, women are an important voice in the household in decisions related to farms. Frequently, they are involved in collecting and sowing seeds, as well as providing informal education to the next generation and as such, they need to be considered as a key target group for FLR.

12 Social and economic benefits from restoration need to be apparent to smallholders

When restoration takes place on private land, smallholders need to see benefits, financial or otherwise, given the opportunity cost of setting land aside for restoring forests.

In Paraguay, mixing native tree species that also grow slower with faster growing species, including agroforestry, that can provide benefits to smallholders in the short to medium term secured their engagement in FLR (a 'quick win' tactic to demonstrate the value of FLR). In Brazil's Iguaçu National Park for example, agroforestry schemes have helped to better connect local farmers with the park.

13 Private companies are also actors in restoration

Many sectors have a stake in FLR, from large industrial agribusinesses and tree plantations, to the energy sector, the tourism sector among others. Companies operating in these sectors depend on ecosystem services (e.g. water, soils, carbon) and social services (peaceful neighbourhoods, labour..) from the landscape and also have an impact on the landscape and as such should contribute to upscale forest restoration. These companies can contribute to redesign socially and biologically diverse and resilient landscapes.

In the Upper Paraná, for example, large hydropower schemes such as Itaipú (Brazil and Paraguay), have recognised that to extend the life of dams, they need to improve their environment, notably by increasing forest cover through restoration.

14 The effective implementation and enforcement of legal and policy instruments contribute to FLR success

> **Securing the right policy and legal framework alone is insufficient, but in combination with incentives, support and enforcement, they play an important role in FLR.**

In Brazil, the 2012 Forest Code has been an important trigger for large scale forest restoration.

15 Institutional arrangements need to be in place for the long term

> **While policies and legislation that support FLR are necessary, the institutions to implement these effectively are equally important. These institutions need to be legitimate, empowered and lasting.**

In Paraguay, the end of funding signalled the end of a voluntary mechanism (the Conformance with the Forest Legislation) that had worked but collapsed when funding ceased.

16 Monitoring and evaluation need to be pragmatic and user friendly

> **Monitoring is fundamental for learning and adaptive management, yet is often neglected in FLR. New tools and technologies contribute to facilitating monitoring. In addition, monitoring should not be seen only as a verification tool, but also as a means of improving efficiency, learning and as a source of inspiration.**

For example, Brazil's MapBiomas project is making use of Google's Earth Engine platform and available Landsat datasets to reconstruct historical land cover and land use maps which will help monitor change in natural vegetation and track pressures from agriculture, mining etc.

17 Forest landscape restoration requires time

> **Medium and long term thinking and planning are needed considering the social and ecological timeframes for FLR.**

Balancing short term results with long-term sustained action is necessary to inspire and motivate stakeholders. In the Upper Paraná, the ecoregional vision has provided a long-term roadmap for defining FLR actions, for aligning programmes and for strengthening collaboration. Such long-term plans are important to maintain momentum.

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CONCLUSION AND FUTURE PROSPECTS

Over the years, change has been rapid in the three countries of the Upper Paraná: from political to economic turmoil, with inevitable repercussions on the valuable commodities that are the land, the forest and the biodiversity it harbours. Yet, in the field, progress in restoration may not have been as significant as desired in the Upper Paraná.

The deforestation rate in the UPAF remains high, although many signs indicate that change is underway and that the efforts of WWF, Vida Silvestre and its partners are paying off. Science, awareness, civil society mobilisation and some positive political signals such as commitments to the Initiative 20x20 and changes in legislation have improved the situation. However, serious action on the ground is now important to achieve real results, and upscale protection and restoration. Protecting remaining forest blocks from deforestation should be a top priority in the Upper Paraná.

Restoration techniques, agro-ecological alternatives, trained people, etc. all contribute to testing some solutions that can work. Upscaling restoration actions is the next step, aiming to restore corridors and connections, conserving and integrating smaller forest fragments into a viable landscape.

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Restoring forest quality requires decades.

Combining higher level political frameworks (if well enforced) with local level livelihood priorities represents a solid strategy that could lead to lasting results. It combines the 'carrot and stick' methods of an effective policy framework, with the need to address the economic realities of rural populations. It also combines short term priorities – e.g. food production – with longer term ones – e.g. steady supply of ecosystem services for future generations.

For the future, the four pathways envisaged for the Upper Paraná Atlantic Forest's fourth action plan (2019-2023) are more relevant than ever. It is necessary to further strengthen the bonds between the three countries in both the private and public sectors– a role that WWF and Vida Silvestre are actively playing.

Restoring forest quality requires decades: it is more than just compensating the loss of trees by counting numbers of hectares covered with young trees. Long term investment is needed, commitment and local political will, as well as capacity. When human pressures remain and deforestation continues, a multi-pronged approach is essential. Tools and experience from the last 16 years in the three countries reported here are precious. Consolidating awareness, turning goodwill into on the ground implementation, upscaling and ultimately achieving sustainable and resilient landscapes should be the next priority.

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IN BRIEF

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and more to go, in years – the duration of the programme.

3

The number of nations sharing the Atlantic forest heritage.

Almost 15,000

In ha, WWF's contribution to restoration since 2003. However, forest cover change in the last 16 years is still negative.

Positive

The foundations built by partners. Reducing deforestation and scaling up restoration are needed now more than ever.

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Why we are here
To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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