

RESTORASI EKOSISTEM RIAU

Progress Report 2021

APRIL BIDARA









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FOREWORD

It is remarkable that in a year beset by so much disruption, restriction and delay due to the pandemic, so much was achieved at RER during 2021. But then, that is the nature of forests, which when properly cared for and protected, demonstrate a remarkable resilience and ability to recover and grow. In this way, the forest tells its own story.

This is the story of Restorasi Ekosistem Riau or RER in 2021, where the forest and the biodiversity it supports continued to thrive, nurtured by careful and targeted interactions by a committed RER team, a supportive community, and the protection provided by an effective integrated landscape approach.

While the year's highlights were many, none stood out more than the operationalisation of the Eco-Research Camp, stationed on the perimeter of the restoration forest area on the Kampar Peninsula. The camp affords scientists and researchers the opportunity to experience RER up close, supported by the facilities needed to advance their research endeavours.

The operationalisation of the Eco-Research Camp realises one of the RER program's most important ambitions, which is to serve as a source of exploration, education and collaboration as a research hub, and in doing so increase the collective understanding of tropical peat swamp landscapes in Indonesia. Its construction is also a design and logistics achievement, creating a liveable, connected and sustainably functioning facility in such a complex and remote location. It is remarkable that in a year beset by so much disruption, restriction and delay due to the pandemic, so much was achieved at RER during 2021.



BEY SOO KHIANG Chairman, Advisory Board Restorasi Ekosistem Riau



The Eco-Research Camp has quickly proved its value and attractiveness, hosting a research team from the University of Kent during the year as well as scientists and academics from Indonesia, while generating interest from other international scientists and stakeholders keen to pursue research in 2022.

The Eco-Research Camp also awaits visits from a wide range of stakeholders as international travel becomes more likely and awareness of the project spreads due to two important initiatives in 2021: the validation and registration of the RER carbon project in 2021, and the premiere of the Frontier Sumatra documentary on Discovery Asia, providing for the first time a global audience with an up close view of RER and an insight into the workings of the team responsible for its protection and restoration.

The RER approach, which is focused on climate, community and biodiversity, is a demonstration of nature based solutions in action. Through this approach, the RER program supports the Indonesian Government's agenda and goals for climate and biodiversity protection.

Other research advanced during the year included the continuation of a survey to better understand the behaviour of biodiversity in the intersection between natural forest and managed plantations, with a strengthened focus on bird life. In 2021, the RER ecology team published a peer-reviewed article in Oryx – The International Journal of Conservation – on recorded sightings of the Flat-headed Cat (*Prionailurus planiceps*) on the Kampar Peninsula. More encouragingly, we have also captured sighting of an individual and its cub through our camera trap.

A major baseline biodiversity study was also completed in 2021 and the advance of other significant research projects. During the year, researchers from partner Fauna & Flora International completed their survey of RER's largest and most remote concession area in PT Global Alam Nusantara or PT GAN. This painstaking survey over more than 36,000 hectares of untouched terrain, involved the analysis of thousands of camera trap nights and the conclusion of a program wide survey that commenced in 2015.

Through all these initiatives, what stands out is the incredible power of a regenerating forest to inform and guide our approach to a more sustainable landscape.

In closing, I want to again take the opportunity to thank the RER team for the continued commitment to restoring and conserving RER and its biodiversity, and helping to sharing its many insights with the world.



⁰¹ ABOUT RER

RER is an ecosystem restoration programme made up of 150,693 ha of peat swamp forest, situated in two landscapes on Sumatra's eastern coastline

EIGHT YEARS OF RESTORATION

2021 marked Restorasi Ekosistem Riau's (RER) eighth year of operation in 2021 and what might be considered its most difficult to date due to the ongoing impact of the covid-19 pandemic. However, despite the many challenges, RER has continued to make positive progress as it strives to protect and restore this important ecological landscape.

The RER program has continued to expand and evolve since it was established by APRIL Group in 2013 to protect and restore 20,000 hectares of peat forest on the Kampar Peninsula. At COP 21 convened in Paris in December 2015, APRIL announced the program's expansion to a total area comprising 150,000 hectares and committed US\$100 million for an initial 10-year period. In late 2020, APRIL Group increased its commitment, pledging to invest US\$1 for every tonne of plantation fiber harvested per year for landscape conservation and restoration as one of its APRIL2030 commitments. Today, RER is one of the largest private sector-funded peatland restoration initiatives in Southeast Asia. As well as the technical and financial support provided by APRIL Group, RER benefits from access to expertise from partners Fauna & Flora International (FFI) and Indonesian NGOs, BIDARA and Laskar Alam Foundation.

Located at the heart of Kampar Peninsula and Padang Island in Riau Province, Sumatra, RER consists of five ecosystem restoration concession licenses (ERC – *Perizinan Berusaha Pemanfaatan Hutan untuk kegiatan pemanfaatan jasa lingkungan* - PBPH) granted by the Ministry of Environment and Forestry of the Republic of Indonesia for a period of 60 years. RER's four concession areas on the Kampar Peninsula form a contiguous natural forest which cover 130,095 hectares, while the one concession located on the Padang Island covers an area of 20,599 ha. In total, the RER program is granted the permits to manage and restore 150,693 ha of ecologically important peat swamp forests almost the size of greater London.





Size (ha)	Location
20,123.33	Kampar Peninsula
20,598.53	Padang Island
32,781.06	Kampar Peninsula
40,665.67	Kampar Peninsula
36,524.78	Kampar Peninsula
150,693.37	
	Size (ha) 20,123.33 20,598.53 32,781.06 40,665.67 36,524.78 150,693.37

RER concessions on Kampar Peninsula and Padang Island, Riau Province, Indonesia



Progress Report 2021 | Restorasi Ekosistem Riau (RER)



RER employs an integrated production-protection landscape approach. This integrated approach is based on the productive fiber plantations located on the perimeter of RER, which work to protect the interior peat swamp forest and peat domes. These productive Acacia plantations create a buffer zone that effectively mitigates human encroachment, illegal logging and fires

PRODUCTION-PROTECTION LANDSCAPE MODEL

Alongside the RER program, Kampar Peninsula and Padang Island is home to communities, community forests, natural reserves and plantations managed and operated by APRIL or other companies. To manage the needs of this diverse group of stakeholders, RER employs an integrated productionprotection landscape approach. This integrated approach is based on the productive fiber plantations located on the perimeter of RER, which work to protect the interior peat swamp forest and peat domes. These productive Acacia plantations create a buffer zone that effectively mitigates human encroachment, illegal logging and fires. The plantation ring also provides a renewable fiber resource to produce value-added products such as pulp, paper and viscose that generate economic returns and provide employment opportunities. This approach has proven to be a reliable, consistent and effective way to support forest restoration in Indonesia and accommodate significant financial and technical resources required to maintain the program over time.

RER works with the surrounding communities as part of its production-protection approach. Together with APRIL, RER collaborates with communities to find ways to utilise the forest in sustainable and ecologically friendly ways through education and training, while at the same time improving livelihood opportunities to reduce potential threats to the health of the forest. The RER program also







liaises closely with the managers of neighbouring government conservation forests and other fiber plantation concession owners, acknowledging that biodiversity and wildlife don't always respect manmade boundaries and to safeguard the integrity of the broader landscape.

PARTNERSHIPS

RER partners with FFI, BIDARA and Laskar Alam Foundation and who collectively provide access to expertise in landscape management as well as knowledge of the local communities that depend on the forest.

FFI serves as a technical partner supporting RER's science-based restoration approach. FFI has extensive experience in integrating innovative

restoration methods with social needs to deliver sustainable conservation solutions. RER has benefitted greatly from FFI's work, including the completion of a baseline survey of the area's biodiversity, carbon and local community inhabitants. This year, RER and FFI have completed biodiversity survey for RER's last remaining concession, the hard-to-access 36,524.78-hectare PT Global Alam Nusantara or PT GAN concession area located in the heart of the Kampar Peninsula, resulting in several exciting new plant and mammal species discoveries.

BIDARA specialises in community empowerment and social capital initiatives. It works with rural communities on the Kampar Peninsula to ensure their long-term social welfare with a focus on education, health and economic opportunity, in a responsible and sustainable way. Its activities include promoting alternative forest-based incomes, improving farmers' land management skills, encouraging a zero-burn approach to landscape management and supporting low-cost environmentally friendly farming.

Laskar Alam Foundation, based in Padang Island, works to empower individuals and communities to develop sustainable agriculture through community farming, agroforestry education, and school activities. Specific activities across 15 villages have included organising farmer groups, creating land inventories, establishing demonstration plots and implementing fire prevention and awareness programs.

APRIL Group is a leading producer of fiber, pulp, paper and viscose with plantations and integrated manufacturing operations situated in Riau Province. The company provides financial support, leadership, operational resources and technical expertise to the RER program.

RER also has working relationships with Tropenbos Indonesia and Wildlife Conservation Society. Tropenbos Indonesia are assessing the wood supply and livelihood needs of Serapung and Segamai villages, located on the Kampar Peninsula, who have received government licenses for village forests comprising 2,000 hectares, located adjacent to RER. Wildlife Conservation Society is partnering with APRIL and RER on strategies to prevent the trade in illegal wildlife and developing a concept for a biodiversity conservation research hub.





LANDSCAPE MANAGEMENT

RER teams actively manage and protect the Kampar Peninsula and Padang Island through a range of activities including regular surveys and assessments of biodiversity, forest and hydrology conditions, partnership with communities, cooperation with other land managers, and restoration activity in areas where it is needed. These are detailed in later sections of this report.

An important achievement since the establishment of RER in 2013 is the cessation of fires. There have been no recorded hot spots or fires inside RER area on the Kampar Peninsula for the past eight years. RER teams actively monitor weather conditions, ensure fire suppression teams are prepared and communicate regularly with fishermen and other forest users to prevent fire use within the forest.

To increase our active protection capabilities, a further Ranger Protection Post was built in Tasik Tengah, Kampar Peninsula during the year. Located deep inside the RER concession area, this post will enable our ranger to better protect the area, and also serve as an overnight stay to researchers who want to study the area. We are also constructing 3 rangers post in Padang Island to improve our protection capability.

During 2021, the PT Gemilang Cipta Nusantara concessions situated on Padang Island and Kampar Peninsula received an Indonesia Forestry Certification Cooperation (IFCC) Certification for Sustainable Forest Management. The certification was the first in Indonesia for an ecosystem restoration concession. RER will continue the process for three other concessions in 2022.

ADVISORY BOARD

RER teams receive guidance from an Advisory Board that includes Indonesian and international third-party experts on conservation, community engagement and landscape management.

In January 2022, one of our RER Advisory Board members, Nasihin Hasan, sadly passed away. Pak Nasihin played an integral role in the RER program from the very beginning. He was a wise, experienced and generous person. We all benefitted from his guidance and we will greatly miss him. His leadership and oversight were key elements in the success of the RER over the years.



Bey Soo Khiang	Chairman of APRIL Group
Mark Rose	Chief Executive Officer, Fauna & Flora International
Jeffrey Arthur Sayer	Professor of Tropical Forest Conservation, University of British Columbia
l Made Subadia Gelgel	Director General of Forest Protection & Nature Conservation (2002-2003)
Kartini Sjahrir	Anthropologist and Ambassador to Argentina (2010-2014)
M. Nasihin Hasan	Founder & Director, Community Resources Development Institute (BIDARA)
Anthony Sebastian	Conservation Planning Specialist
Lucita Jasmin	Director for Sustainability & External Affairs of APRIL Group





ECO-RESEARCH CAMP

Constructed in 2020, RER's Eco-Research Camp became operational in 2021. This is a significant achievement given the Camp's isolated location on the edge of the RER area, and the complexity involved in developing a livable, functioning facility amid pandemic restrictions.

The Camp includes a dedicated Peat Lab to support researchers and scientists wishing to experience RER firsthand and undertake research. The Peat Lab consists of basic tools and apparatus to support researchers in their study. During 2022 the Eco-Research Camp hosted a researcher from Kent University studying mammal populations on the Kampar Peninsula, building on and updating the baseline study completed by FFI in 2015. This study is due for completion at the end of 2022. The Camp also hosted four professors from Riau University who shared their knowledge on insect identification with our field team as well as passing on insight on fish processing methods for local communities.

In 2022 the Camp will continue to function as a base for a number of existing research projects, while also hosting visits from local and international stakeholders.



02 BIODIVERSITY

Continuous monitoring revealed a new total of 838 species of plant and animal identified in the RER area – an increase of 12 species on the year prior, comprising 2 mammals, 5 amphibious reptiles, 3 birds, 5 plants and 1 Odonata

PLANT AND ANIMAL MONITORING

Plant and animal monitoring is an essential part of any restoration project and is a key operational task that the RER team undertakes each year with the support of FFI. Intensive biodiversity surveys were first conducted in 2015 by FFI to establish a baseline on species presence on the Kampar Peninsula. Since then, RER teams have continued to build upon this data using a range of monitoring tools including camera traps and transects.

In 2021, the COVID-19 pandemic and associated restrictions posed a challenge to wildlife monitoring. Several planned surveys involving external experts were postponed due to the health and safety precautions and travel restrictions, including an Odonata survey conducted by Dr. Rory Dow a wellpublished expert on tropical Odonata species and a member of the IUCN Odonata Specialist Group. This study remains partially completed and it is hoped it will be completed in 2022.

Nevertheless, RER field teams continued to gather valuable information about wildlife throughout the year through the use of remote camera trapping, bird monitoring and floristic surveys. Continuous monitoring revealed a new total of 838 species of plant and animal identified in the RER area – an increase of 12 species on the year prior, comprising 2 mammals, 5 amphibious reptiles, 3 birds, 5 plants and 1 Odonata. To give a sense of scale, camera traps deployed by the RER team collectively captured 6,843 nights of activity on the Kampar Peninsula and Padang Island.

To date, 78 mammal species have been recorded in RER, including five of Sumatra's six cat species, among them the critically endangered Sumatran Tiger and the endangered Flat-headed Cat. The species count also includes seven primates, 311 bird species, 106 species of herpetofauna and 197 species of plants.

Of the 838 species of plants and animals so for recorded, many are of conservation concern with 69 listed on the IUCN Red List as being Vulnerable (39), Endangered (18) or Critically Endangered (12). Two species were raised to Critically Endangered, the East Sumatran Banded-Langur and Giant Soft-Shell Turtle. There are also 117 species on the CITES list and 99 species noted by the Government of Indonesia as being of conservation concern.





Таха	Total	IUCN		Convention on	Government	
		CR	EN	VU	in Endangered Species (CITES)	or indonesia
Mammals	78	3	5	12	26	18
Amphibians & Reptiles	106	3	3	3	19	5
Birds	311	1	6	16	45	76
Plants	196	3	1	5	27	0
Fish	89	2	1	2	0	0
Odonata	58	0	2	1	0	0
TOTAL	838	12	18	39	117	99
	-	-				

Plant and animal species recorded in RER



Bird life continues to flourish in RER according to surveys. Since 2016, RER has participated in two important bird monitoring programs: Migratory Raptor Monitoring and the Asian Waterbird Census. These programs support RER's conservation efforts as well as contributing to global forest and wildlife conservation initiatives.

Migratory Raptor Monitoring is a biannual event held in the spring and autumn in the northern hemisphere on the Kampar Peninsula and Padang Island. The event monitors birds of prey that fly from the temperate forests of China and Russia towards the Malayan Peninsula and Indonesia to escape the cold of winter and to breed, before returning. This year's survey recorded the highest number of raptors during an autumn migration period, totaling 1,250 birds from three species groups with the predominant species the Oriental Honey Buzzard.

The Asian Waterbird Census (AWC) is conducted in January and February each year throughout the Asia Pacific region. The census serves as an indicator of the condition of regional wetlands. In Indonesia, the event is led by Wetlands International and the Indonesian Ministry of Environment and Forestry. The data collected is shared with global conservation organisations such as IUCN and the Ramsar Convention, while the Ministry will use the data to ensure conservation and sustainable management of wetlands in Indonesia. A total of 13 species of waterbirds were observed with total number of 211 individual birds recorded, including the first recorded sighting of the Asian Openbill in Indonesia during the census period. The most abundant species were Purple Herons with 112 birds sighted.

Last year, RER ecology team has published a peerreviewed article in Oryx – The International Journal of Conservation – on the records of the Flat-headed Cat (*Prionailurus planiceps*) on the Kampar Peninsula. The article reports 11 detections of this Endangered species during 2015-2018 camera trap survey. These were the first record of this species on the Kampar Peninsula. Another encouraging sighting of this species was recorded in 2021, where one individual was passing in front of the camera trap with its cub.

No.	Survey	Period	Findings
1.	Asian Waterbird Census	January - February 2021	131 birds of 14 species were observed, including the first recorded sighting of the Asian Openbill in Indonesia during AWC.
2.	Migratory Raptor Monitoring	March 2021 - September 2021	Highest number of raptors during the autumn migration recorded from Padang Island, totaling 1,240 birds of 3 species. Predominant species is Oriental Honey Buzzard.
3.	Edge Effects Study	July 2021 - June 2022	A total of 12 km of transects have now been completed since the beginning of the project, with almost 70 species recorded, including elusive migrants including like the Malayan Night Heron.
4.	Production- Protection Camera Trap Survey	February - September 2021	Including 52 2x2 km grids and a total of 2,410-camera trap nights in neighboring Acacia plantations, the survey recorded 16 species in 168 independent photos including the critically endangered Sunda Pangolin.
5.	Baseline Biodiversity Survey at PT Global Alam Nusantara (PT GAN) conducted by Fauna and Flora International (FFI)	2020 - August 2021	A total of 5,368-camera trap nights across 91 survey grids produced 837 images with 365 capturing an independent event. Among them, 15 mammals are documented including the Sumatran Tiger and Sunda Pangolin as well as new records of the Sumatra porcupine and Pen-Tailed Treeshrew on the Kampar Peninsula. There were also six new records of herpetofauna including the first record of a Smooth Tree-Frog (<i>Theloderma</i> <i>licin</i>) in peat swamp forest on the East coast of Sumatra.
6.	Kent University PhD Student Research	October 2021 - December 2022	Completion of the first of three grid systems (Eastern Grid) is expected in early Q1 2022. 60 camera traps have been deployed with preliminary data being collected.

RER biodiversity surveys in 2021



EDGE EFFECTS STUDY

In 2020, RER expanded its research activity to include the boundary areas of APRIL Group's sustainably managed fiber plantations under the management of its operations arm, PT Riau Andalan Pulp and Paper. Called the Edge Effects Study, it is a year-round study that aims to better understand mammal and bird species behaviour across the edge or transition between RER's peat swamp forest and the adjacent acacia plantation.

In 2021, the study was expanded to include analysis of migratory and non-migratory bird distribution along two kilometer transects between fiber plantation and natural forest areas on the Kampar Peninsula. The research continued despite logistical delays due to COVID-19 and travel restrictions and working around harvesting operations. The study will be completed in 2022.

The first round of sampling project was completed between May and August 2020, involving a total of 1,133 camera nights. Between February and September 2021, additional cameras were deployed across 50 2 x 2 km grids totaling 2,410 camera trap nights overall, generating 168 independent images of mammal and bird species. Preliminarily analysis of this data has identified 16 species of mammals and birds comprising Red Jungle-Fowls, Leopard Cats, Wild pigs, and Asian Palm Civets. These add to the previous sighting of the critically endangered Sunda Pangolin and Malay Weasel, which was identified in the fiber plantation area 730 m from the forest edge. The Malay Weasel has not been documented in Riau Province since 1904¹¹.

Land Cover	Number of Camera	Night Traps
Acacia	44	2,125
Rubber	5	223
Other	1	62

1) Duckworth, J.W., Lee, B.P.Y., Meijaard, E. & S. Meiri (2006) The Malay Weasel Mustela nudipes: distribution, natural history and a global conservation status review Small Carnovire Conservation 34 & 35: 2-21



MAMMAL DIVERSITY & DISTRIBUTION ON THE KAMPAR PENINSULA

In October 2021, a researcher from The University of Kent's Durrell Institute of Conservation and Ecology (DICE) began landscape level research on the dynamics and movements of mammal populations across the Kampar Peninsula. This is the first research project to be hosted at the Eco-Research Camp, supported by the newly formed Peat Lab Team whose function is to support researchers conducting research in or around RER.

The research involves strategically placing camera traps across 3 grid systems across RER's concessions, APRIL's plantation area, as well as known habitat frequented by Sumatran Tigers. The resampling of some previous sampled areas will allow researchers to compare mammal presence and fluctuations with historic data collected from FFI's 2015 baseline survey. Data recording the occupancy of species will be tested against several covariates including forest cover type, distance to the forest edge, roading, plantations, human settlement and others.

To date, the Peat Lab Team and DICE teams have installed over 60 camera traps, with preliminary results indicating the presence of some familiar lowland and peat swamp specialist wildlife species. Camera trap installation will continue in 2020 across the project's grid systems, with data analysis conducted in parallel as grids are completed.



BIODIVERSITY BASELINE SURVEY COMPLETION

Due to its remote location in the centre of the RER area, the 36,524.74-hectare PT Global Alam Nusantara or PT GAN concession area has been one of the least scientifically studied parts of the Kampar Peninsula landscape to date. That has now changed following the completion by FFI of the final biodiversity baseline study during the year.

To complete the survey, camera trapping was conducted across 91 2 x 2 km survey grids, recording 5,368 individual camera trap nights covering 300 km² of the 365.25 km² PT GAN area. The survey captured 837 video and still images recording 365 independent events and identifying 23 species – 15 mammals and 8 bird species, with the critically endangered Sumatran Tiger and Sunda Pangolin among them. Notable events included the unanticipated finding of a Sumatran Tiger in a peat dome area and new recordings of the Sumatran Porcupine and Pen-tailed Treeshrew on the Kampar Peninsula and rare sighting of the Flying Lemur and Helmeted Hornbill, which hadn't been sighted in the area for several years.



The Pen-tailed Tree shrew is common on the Malay Peninsula and in Borneo, but rarely found in Sumatra. The survey also identified six new herpetofauna sightings, including the first record of a Smooth Tree-Frog (*Theloderma licin*) in peat swamp forest on the East coast of Sumatra.

The data gathered from this survey will be used to complete a comprehensive baseline understanding of the plant and animal communities present within RER. The methods used are the same as the initial three RER concession surveys that took place in 2015.







Turtles form part of food webs and play important roles as food consumers, prey, and as living habitats that can transport invertebrates and microorganisms, forming part of a habitat's nutrient cycle

RER PUBLICATION NO.6: TURTLES OF THE KAMPAR PENINSULA

In March 2021, RER published its sixth in a series of RER Publications that describe the biodiversity present on the Kampar Peninsula. This publication describes turtle species that have been recorded on the Kampar Peninsula, which consists of 14 species including the critically-endangered Bornean River Turtle and Painted Terrapin. Turtles have an important role in the RER's ecosystem as they provide a connection between aquatic and terrestrial habitats. They form part of food webs and play important roles as food consumers, prey, and as living habitats that can transport invertebrates and microorganisms, forming part of a habitat's nutrient cycle.

As predators, turtles help to control populations of small organisms such as snails and insects, distribute seeds, and help to keep river and lake communities in equilibrium. They also prey on dead or sick animals, which in turn helps to maintain good water quality.





CASE STUDY

Insect Identification Training

Between 8 and 12 September 2021, RER hosted the first Insect Identification Training Workshop in collaboration with University of Riau. The Workshop was convened to help RER field teams identify the various insects present in and around RER. Invertebrates represent a large proportion of the total biodiversity in forest ecosystems but are generally poorly documented. Over the course of three days, RER's team members learned the theoretical background behind insect sampling, field work and collection, as well as preservation techniques. The Workshop's first day covered general knowledge of insects including diversity, lifecycle, ecosystem roles, relationships with humans, and identification methods. Field work was conducted on day two, with sampling in and around the Eco-Research Camp, collecting a variety of insects with sweep nets. The last day concluded with a practical lab session on preservation of specimens. The event concluded with 27 species from 7 orders of insects recorded and laying a foundation for future invertebrate surveys of the Kampar Peninsula.





BIODIVERSITY OF RER



21



Mammals

Amphibians & Reptiles



Birds



Plants



Fish



Odonata

Printed on PAPER

03 CLIMATE

The 2021 annual rainfall was 4% above normal on the Kampar Peninsula and 13% above normal on Padang Island

WEATHER MONITORING AND FIRE MANAGEMENT

The landscapes of the Kampar Peninsula and Padang Island are warm, moist tropical peat swamp forests with an average annual rainfall of 2,145 mm on the Kampar Peninsula and 2,163 mm on Padang Island. Rainfall fluctuates seasonally, and dry seasons commonly occur twice per year, in late January to February and from June to September.

The 2021 annual rainfall was 4% above normal on the Kampar Peninsula and 13% above normal

on Padang Island. The lowest rainfall occurred in July in Kampar Peninsula (94.1 mm) and in February in Padang Island (103.9 mm).

During the dry season, river flows usually reach their lowest level in the RER. In Serkap River, the lowest level occurred in October (2.5 m) and the highest level occurred in May (3.7 m). For the Sangar River the lowest level occurred also in March (1.9 m) and the highest level occurred in April (2.9 m).

The difference between the lowest and highest river levels is 1.0+ meter on both Serkap and Sangar rivers.









Consistent with the above normal rainfall in 2021, peat water tables remained near the soil surface maintaining peat soil moisture and minimizing the hazard of fires from igniting. Additionally, RER on Kampar Peninsula had zero fire incidents in 2021 with no community land clearing or fire use activities occurring within or adjacent to the RER.

RER Forest Protection teams responded to six fire incidents on Padang Island during the year, resulting from land clearing and burning by the local community beyond the RER boundary. These fires were immediately extinguished.

Satellite detected 'hotspots' are a means of monitoring the location of possible fire events that may threaten the RER. Although 348 hotspots were recorded in Riau Province during 2021, including 14 on Kampar Peninsula and 35 on Padang Island, there were no hotspots identified within RER.

RER has in place a system to analyze daily fire danger, calculated based on daily rainfall, total rainfall from last 15 days, total day without rain, relative humidity and fuel condition. This calculation determines a Fire Danger Rating (FDR) that is either Low, Medium, High and Extreme. RER's firefighting team will conduct patrols inside RER and in adjacent areas when the rating is High or Extreme. In 2021, the FDR was Extreme for 7 days and High on 11 days.











FOREST RESTORATION

Degraded tropical peat swamp forest can recover without significant human intervention provided there are no new disturbances such as illegal logging, land clearing or fire. For RER, an already high level of forest cover and the often-isolated nature of potential restoration sites make natural regeneration the most cost-effective approach to restoring the forest. Across the RER, less than 900-hectares or 1% of the total area requires intervention, with nature restoring the remaining landscape.

The identification and prioritization of these restoration sites is essential to ensure operational efficiency. For preliminary assessments, RER teams use satellite imagery, aerial reconnaissance by helicopter and drone photography to identify patches of highly degraded forest that may require active restoration. These highly degraded sites have often experienced excessive drainage by old canals, intensive logging and one or more forest and land fires.

After being verified and supported with on-theground inventories and assessment, RER produces site-specific restoration plans that identify species, planting technique, and monitoring and maintenance requirements. In 2021, 52-hectares were restored through this process. In addition to tree planting, restoration activities also focused on maintaining 136 hectares of restored forest area.

Year	Planting	ANR/Enrichment	Maintenance	Natural Regeneration
2014	0.26	0.00	0.00	-
2015	5.41	3.23	0.00	2,072.00
2016	4.57	0.00	6.58	2,043.50
2017	0.09	0.00	0.63	10,316.00
2018	19.34	24.67	4.37	11,080.00
2019	4.67	5.47	162.00	10,403.00
2020	0.00	3.00	182.52	21,693.20
2021	45.68	6.48	174.06	11,668.00
Total	80.02	42.85	530.16	69,275.20
	-		-	

Annual restoration and maintenance progress (in Ha)



Progress Report 2021 | Restorasi Ekosistem Riau (RER)



In 2021, RER maintained 38,000 seedlings in seven nurseries on the Kampar Peninsula and Padang Island

TREE NURSERIES

Restoring tree cover on a landscape as large and remote as the RER poses significant logistical challenges. To overcome this challenge, mini nurseries are developed close to remote restoration sites. RER maintains a stock of natural seedlings in its nurseries consisting of 60 different native tree species collected from the RER's peat swamp forest.

In 2021, RER maintained 38,000 seedlings in seven nurseries on the Kampar Peninsula and Padang Island. From this stock, the RER team planted around 15,900 seedlings to replace dead plants in identified restoration areas, and a further 20,500 seedlings from RER nurseries are ready to be planted in restoration areas throughout 2022.

Estate	Number of Nurseries	Number of Species	Number of Seedlings	Seedlings Planted in RER	Seedlings Ready to be Planted
Kampar Peninsula Restoration	5	4.0	32,277	15,931	14,823
Padang Island Restoration	2	80	5,938	0	5,732
Total	7	60	38,215	15,931	20,555
Nursery stock in 2021					





HYDROLOGICAL RESTORATION

Tropical peat swamp forest soils are composed of 90% water and 10% organic solids. The water table depth of peatland varies seasonally with rainfall and evapotranspiration. Water may be several centimeters above the surface in the wet season and drop to 100 cm below the surface in extended periods of drought. A good indicator of a healthy peatland is if it is actively accumulating peat at a rate of 1-3 mm per year.

By 2013, much of the Kampar Peninsula and Padang Island had been degraded by decades of commercial and illegal logging. These activities removed large trees and created networks of drainage canals and rails to transport logs out of the forest. Typically, the drainage canals were 1-9 meters wide and 50-150 centimeters deep. These canals caused peat subsidence, making the forest vulnerable to fire by drying the peat surface. Dry peat enhances peat oxidation and decomposition, releasing carbon dioxide in the atmosphere. Since 2016, RER has been working on closing the old drainage canals to maintain peat moisture within normal seasonal fluctuations. The overall objective of this work is to re-wet the peat, retaining water in the soil during dry seasons to minimize peat drying, oxidation and subsidence and minimize fire threats and potential carbon emissions.

To date, RER teams have verified 39 canal systems that are 202 kilometers in length across the RER area. The Kampar Peninsula hosts 25 of these canal systems which are 137 kilometers in length and impact 8,678-hectares. The other 14 canals totaling 65 kilometers and impacting 3,966 hectares area have been verified on Padang Island. RER has opted to leave two research canals open to determine the effect of canal closure activities on water table conditions. This is long-term research that we estimated will be completed in 2025.

RER's goal is to restore water control at 40 cm elevation intervals along the entire canal network by 2025. Before blocking these canals, RER teams conduct surveys to determine the length, width, slope and optimal location for dam placement. In 2021, RER built 8 dams to close four canal systems that were 18.3 kilometres in length and impacting 9,359 hectares. Over the course of five years, RER has achieved 74% of its goal by constructing 87 dams to successfully close 31 canal systems, totaling 176.5 kilometres in length and 12,644 hectares of impacted area on the Kampar Peninsula and Padang Island.

Year	Canal	# of Dams	Length (km)	Impacted Area (Ha)	
2015	1	2	2.704	109.4	
2016	5	17	20.269	1,207.0	
2017	2	4	15.045	902.1	
2018	12	30	44.060	2,915.6	
2019	5	15	45.454	2,845.1	
2020	2	11	30.693	941.1	
2021	4	8	18.300	9,359	
Total	31	87	176.525	18,279.3	
Annual canal closures in RER					





Progress Report 2021 | Restorasi Ekosistem Riau (RER)

To assess the impact of canal closures on peat water table levels, water monitoring is undertaken through manually measured dip-wells. The dip-well locations are established on multi-kilometre transects across the terrain, from river edges to deep in the forest. Water table levels are measured at between one and three month intervals. The data collected allows RER teams to monitor the trends of seasonal water levels relative to monthly rainfall. RER has begun installing auto loggers that can automatically and continuously records fluctuations in water level across the RER to improve the quality of water level and peat subsidence monitoring data. RER also monitors water level movement on the Kampar Peninsula's Sangar and Serkap Rivers.







CASE STUDY

Integrating Carbon with Biodiversity and Community

A significant milestone in 2021 was the completion of assessment, validation and registration of the RER's carbon project. The completion of this process made RER carbon project potentially as one of the world's largest voluntary verified tropical carbon project.

Verified using the globally accepted Verified Carbon Standard or VCS, it is estimated that RER will avoid the emissions of approximately 6.02 million tonnes of carbon per year. The ability to measure and value RER's carbon stock will help to put a real value to the restoration and protection of RER's biodiversity over time as part of its production-protection approach.

The project carried out in the RER is aligned with the Government of Indonesia's climate agenda. It also shows the value of restoring ecosystems and protecting biodiversity as nature-based solutions that can support both economic development and protection of the environment.



04 COMMUNITY

There are 17,000 people living on the Kampar Peninsula, residing in nine villages located on the opposite side of the river from the RER concessions separated by approximately 20km. While on Padang Island, there are approximately 24,000 people living in 20 villages, most of them inhabiting the East coast of the island

There are 17,000 people living on the Kampar Peninsula, residing in nine villages located on the opposite side of the river from the RER concessions separated by approximately 20km. Most of the residents are on the south side of the Kampar River. They come from several ethnic groups, with Melayu as the most dominant, with Javanese and several other ethnic groups migrating to this area in the past.

Their economic activities are diverse, with communities relying on several activities to fulfill their basic needs. Livelihood often depend on market trends or commodity prices. For instance, from March-to-May some focus on honey gathering, while during other months they regularly fish in one of the Kampar Peninsula's four rivers that pass-through RER. In general, these livelihood activities are based on the availability of natural resources and can be grouped into three main categories: agriculture and forest products (rice, maize, betel nut, chili, vegetables, and honey), plantation (sago, coconut, palm oil, and rubber), and freshwater fishery.

Communities also utilise non-timber forest products derived from RER such as freshwater fish and forest honey. For example, proceed from the sales of Madu Hutan Riau reached IDR 42 million from 320 litres of honey. Residents also benefit from the existence of RER as a source of clean water and water supply during long periods of drought. On Padang Island, there are approximately 24,000 people living in 20 villages, most of them inhabiting the East coast of the island. Ethnic groups include the Akit as well as Malays, Javanese, Banjarese, Bataks and Bugis. The main livelihood activity is agriculture and fishing. Rubber, sago and coconut plantations established in the 1960s have become the basis of the local economy.

FARMING

Community development programs were carried out in line with strict COVID-19 health protocols during 2021. Together with its partners, RER conducted several activities focused on developing and improving farming skills as well as continuing community welfare programs.

On Padang Island, RER together with its partner Laskar Alam, collaborated with local farmers and youth groups to develop agroforestry demonstration plots with a focus on increasing agricultural yield in a limited land area sustainably. These demonstration plots used intercropping methods that combined betel nut, rubber and pineapple. Sessions were also held on no-burn farming.

On the Kampar Peninsula, RER and its partner BIDARA helped communities to grow vegetables and fruit in villages level on unused areas of land.





With the right cropping techniques, households can harvest commodities such as chili, eggplant, chickpea, celery, banana and cassava up to three times a year.

The Fire Aware Community (FAC) program, as part of APRIL Group Fire Free Village Program (FFVP), was launched in two villages on Padang Island to educate the community about the risk of fires and support fire prevention. Several community awareness and community engagement activities were conducted as part of the program to promote fire-free farming concepts and initiatives and helping community members to better understand the impacts of burning and smoke haze on their children and vulnerable members of their communities.

FISHERY

Local fishermen fish seasonally in the four rivers that pass-through RER: the Kutup, Sangar, Serkap and Turip Rivers. Various local fish species have been observed in RER such as Kissing Gourame, Snakehead, Mystiid Catfish, Glass Catfish, Giant Snakehead, Threadfish, and Wallago Catfish. This abundant fish supply is an important source of income if managed sustainably.

During the fishing season, fishermen typically stay in huts located on the riverbanks. RER works together with these fishermen to ensure they fish using sustainable methods that are not harmful to the environment or the forest. In 2021, RER renovated







Together with its partners, RER conducted several activities focused on developing and improving farming skills as well as continuing community welfare programs

riverbank huts so to better protect fishermen from sun and rain and providing 150 kg of fishing nets to renew fish traps. RER also provided 18 solar panel installations for the huts so that they no longer need to use kerosene-based lamps at night. This works to reduce the use of fossil fuels, decreases the risk of fire and minimizes the inhalation of kerosene smoke in the evening.

Based on the compiled data, 4,017 kg of fish was harvested from the Serkap and Sangar rivers by 667 fisherman entries in 2021, with 66% of fishermen coming from Teluk Meranti Village, 14% from Pulau Muda Village and 8% from Sangar Village. Solar panel assistance to local community

RER also collaborated with the University of Riau to conduct freshwater aquaculture and fish product processing training to help improve the livelihoods of local fisherman. The two trainings were attended by fishermen groups and women under the family welfare group (PKK/*Pemberdayaan Kesejahteraan Keluarga*) from six villages.

COMMUNITY RELATIONS

Despite the disruption caused by the COVID-19 pandemic, RER's community welfare programs continued and included support for religious and sports activities, employee volunteering programs, eco-education for elementary school students, campaigns to encourage clean and healthy living behavior, and the promotion of clean water facilities. In total, RER conducted 120 activities in 17 villages around the RER concession on Kampar Peninsula and Padang Island.



CASE STUDY

Community Fishery Training

In October 2021, RER hosted a community fishery training session at its Eco-Research Camp attended by 29 participants from five villages surrounding RER. The training session aimed to equip local fishermen with the skills they need to ensure a sustainable fish population is maintained in the Kampar Peninsula's rivers. The two-day training session was led by University of Riau experts, who talked about fish processing and cultivating as well as the importance of fish restocking.

The training session also shared fish processing skills to improve fish products

shelf-life, reduce fish loss during processing, and how to utilize by-products from fish processing to produce valueadded products, converting waste into economic and environmental gain.

The second day of the training discussed processing fish products. Most fishermen sell their fish fresh or smoked (or 'salai') which limits their options, so the training covered how to process fish into fish balls, fish nuggets and various kinds of fishcakes to generate additional value from their fish catches.



Community fishery training

05 OUTREACH & ENGAGEMENT

RER is an ecosystem restoration programme made up of 150,693 ha of peat swamp forest, situated in two landscapes on Sumatra's eastern coastline

FIELD VISITS

Understanding the challenges, scope and ambition of an ecosystem restoration program as significant as RER benefits greatly from firsthand experience. Field visits plays an important role in helping stakeholders understand the RER's scale and its operational challenges. Understandably, due to the COVID-19 pandemic, RER received no visitor in 2021. We hope that a lifting of restrictions and safer travel conditions will see a resumption of visits in 2022, supported by RER's Eco-Research Camp.

EXTERNAL ENGAGEMENT

RER teams were able to share their expertise and knowledge at a number of national and international events held virtually during 2021. These included:

- Creating Partnerships to Protect Endangered Wildlife hosted by We Value Nature on 15 March 2021. The dialog emphasized on the importance of collaboration between business and conservation NGOs in protecting biodiversity.
- 2. Indonesia Climate Change Virtual Expo & Forum 2021: Road to COP26 UNFCCC Glasgow hosted the Ministry of Environment and Forestry of Indonesia on 5 June 2020. RER shared its experience in managing large scale ecosystem restoration program.

- 3. Wildlife Photography in Times of Pandemic: Hobby, Adventure and Career at Kompasfest on 20 August 2021. RER ecologist, Prayitno Goenarto, shared how his passion on birding help his work in RER.
- Multi-Stakeholder Collaboration for Effective Approaches to Landscape Management virtual dialogue at IUCN World Conservation Congress on 4 September 2021 on the importance of engaging various stakeholders from communities to NGOs and goverments in managing a landscape.
- Becoming the World's Leader in Green Economy: Leading in NDC Implementation at Indonesia Pavilion in COP26 Glasgow, 2 November 2021. Both RER and APRIL were presented to show how business and ecosystem restoration can contribute to green economy.
- Business Actors and Climate Actions: Generating Revenue and Providing Benefits to the Nature at Indonesia Pavilion in COP26 Glasgow on 11 November 2021. RER shared how it benefitted from production-protection landscape model employed by APRIL Group in its ecosystem restoration efforts.
- What Net Zero Means for The Private Sector hosted by Indonesia Business Council on Sustainable Development (IBCSD) on 14 December 2021. Both RER and APRIL were presented to show how business and ecosystem restoration can promote the net zero agenda.







CASE STUDY

Frontier Sumatra at Discovery Asia

Frontier Sumatra is a documentary showcasing the RER's wildlife and restoration activity on the Kampar Peninsula. Produced by an independent film company, Beach House Pictures, the documentary captures RER's ambition and

Filmed in 2020, the documentary premiered on Discovery Asia in September 2021

and was positively received by critics and Indonesian story focused on conservation and restoration that illuminates the work of RER's scientists and forest managers, as well as giving voice to local communities and conservationists on the positive impact of APRIL's production-protection landscape Europe, USA and Canada in 2022.



FINANCIAL SUMMARY

in USD ('000)							
No.	Description	2013-2016	2017	2018	2019	2020	2021
1.	Employees	1,420	784	960	1,141	1,214	1,176
2.	Total Operational & Overhead Costs	1,778	809	958	869	959	1,468
3.	Legal and License Costs	5,185	2,470	161	334	237	179
4.	Partnerships*	3,202	1,240	181	379	154	430
5.	Advisory Board	149	11	11	19	-	-
6.	Capex	566	488	377	1,260	1,953	110
	Total	12,300	5,822	2,648	4,002	4,517	3,364
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* Dependent on the phasing of the implementation of agreed activities







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