



Progress Report 2017

# Restorasi Ekosistem Riau

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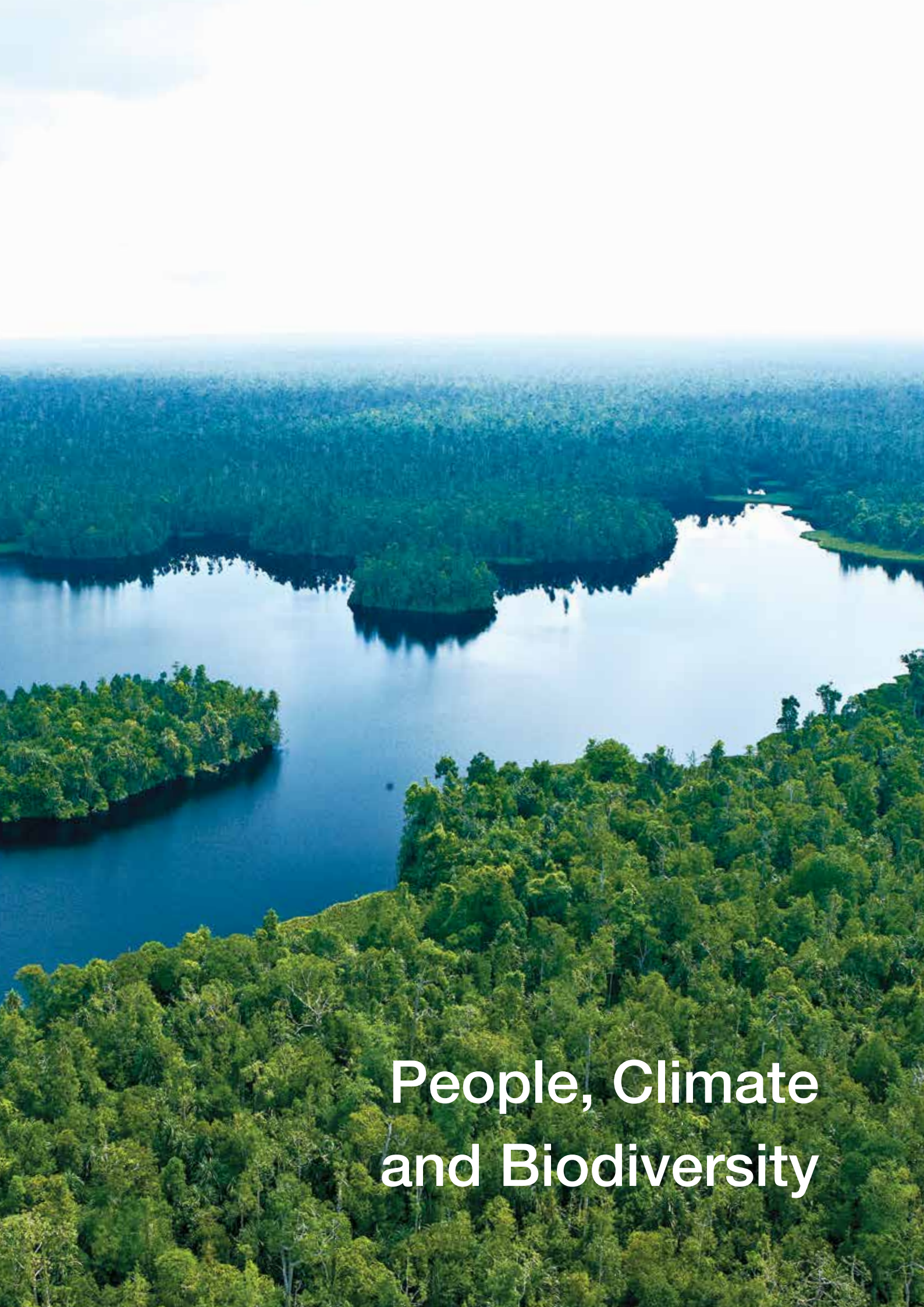


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# People, Climate and Biodiversity

## Foreword



**Bey Soo Kiang**  
Chairman, Advisory Board  
Restorasi Ekosistem Riau

It has been five years now since the ground-breaking Restorasi Ekosistem Riau (RER) collaboration was established to restore and conserve important areas of peatland forest on the Kampar Peninsula and Padang Island in Riau Province, Sumatra, Indonesia.

The RER programme is part of the commitment by APRIL to conserve one hectare for every hectare planted under 60-year eco-restoration licences granted by the Indonesian Ministry of Environment and Forestry. To date, APRIL has met 83% of its goal, with approximately 421,000 hectares of forest protected, conserved or being restored.

This is in line with the company's wider commitment, laid out in its Sustainable Forest Management Policy 2.0 published in 2015, to advance sustainable development in all locations where it operates by implementing best practices in social, environmental and economic spheres. This is further guided by our business philosophy that whatever we do must be 'Good for Community, Country, Climate, Customers, and only then, Good for Company'.

Since the foundation of RER, we have learned much, from the right tools and techniques to support long-term ecosystem restoration on peatland, to how best to effectively implement our production-protection approach in order to deliver economic, environmental and social benefits for the communities, the region and the country.

Supported by our Protect, Assess, Restore, Manage strategy - across 150,000 hectares of peatland - we have seen some extraordinary results since work began including the return of hundreds of species of fauna and flora and the total absence of fire from the concessions.

The work done by our teams last year has also had a positive impact on the daily lives of the communities living in and around the RER area.





**We have seen some extraordinary results since work began, including the return of hundreds of species of fauna and flora and the total absence of fire from the RER concessions.**

RER teams go to great lengths to ensure that traditional community activities like fishing and the gathering of honey are protected and local businesses are supported. With the help of our partners Fauna & Flora International (FFI), BIDARA and Laskar Alam, RER has established sound working relationships with the communities.

The contribution of the programme also extends to the important issue of measuring carbon stock. Last year, FFI released a report on estimated carbon stock in RER, based on extensive field surveys in three of the RER concessions in Kampar Peninsula.

The research was particularly important, in light of the fact that Indonesia holds the largest stock of peat carbon in tropical countries. It stated that 70% of the RER ecosystem restoration concessions (ERCs) holds as much as 688,872,434 tonnes of carbon or 2.5 gigatonnes of CO<sub>2</sub>e. But further assessment is needed to verify the potential emission reduction in RER.

These achievements illustrate our model where RER is complemented by production forestry which provides the financial resources to fund restoration, as well as the protection from an actively managed ring of fiber plantations. We believe this is a potential template for the management of ecosystem restoration areas elsewhere.

Similarly, RER's progress also contributes to the achievement of the Sustainable Development Goals, and in particular Goal 15 - Life on Land which aims to: "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss."

Our long term commitment began when we set up the RER programme in 2013, and continued when we announced our investment of US\$100 million over ten years in December 2015.

I would like to conclude by paying tribute to the efforts of our colleagues working on the RER programme, as well as the contributions of our partners and advisory board members. We have made good progress in 2017, while at the same time understanding that we need to maintain momentum into 2018 and beyond.





To date, APRIL has  
met 83% of its goal  
with more than  
400,000 hectares  
of natural forest  
protected and  
conserved

## 01 Overview





Serkap River on the Kampar Peninsula contains an abundance and variety of fish and supports diverse populations of trees, orchids, birds, mammals and other wildlife

## Purpose

In 2013, APRIL Group set up Restorasi Ekosistem Riau, an ecosystem restoration programme aimed at protecting, restoring and conserving ecologically important peatland forest within Indonesia's Riau Province.

Located on the Sumatra's eastern coastline, RER includes 150,000 ha, of which 130,000 ha are located at the heart of a 344,573 ha forest block on the Kampar Peninsula. Another 20,000 ha is located on Padang Island. The restoration area at Kampar Peninsula is twice the size of Singapore.

The programme is part of APRIL's commitment to conserve one hectare of natural forest for every hectare of fibre plantation. To date, APRIL has met 83% of its goal with more than 400,000 hectares of natural forest protected and conserved. In 2015, APRIL dedicated US\$100 million to support and secure the long-term conservation and restoration programme.

At its inception, RER began with protecting and restoring 20,000 hectares of peat forest on the Kampar Peninsula, in Riau. At the 2015 COP 21 in Paris, APRIL announced the expansion of RER to a total of 150,000 hectares. APRIL has worked closely with partners, such as FFI and BIDARA, who bring social and scientific expertise to the implementation of the programme, and continues to work with these respected conservation organisations.

## Production – Protection Ring Landscape

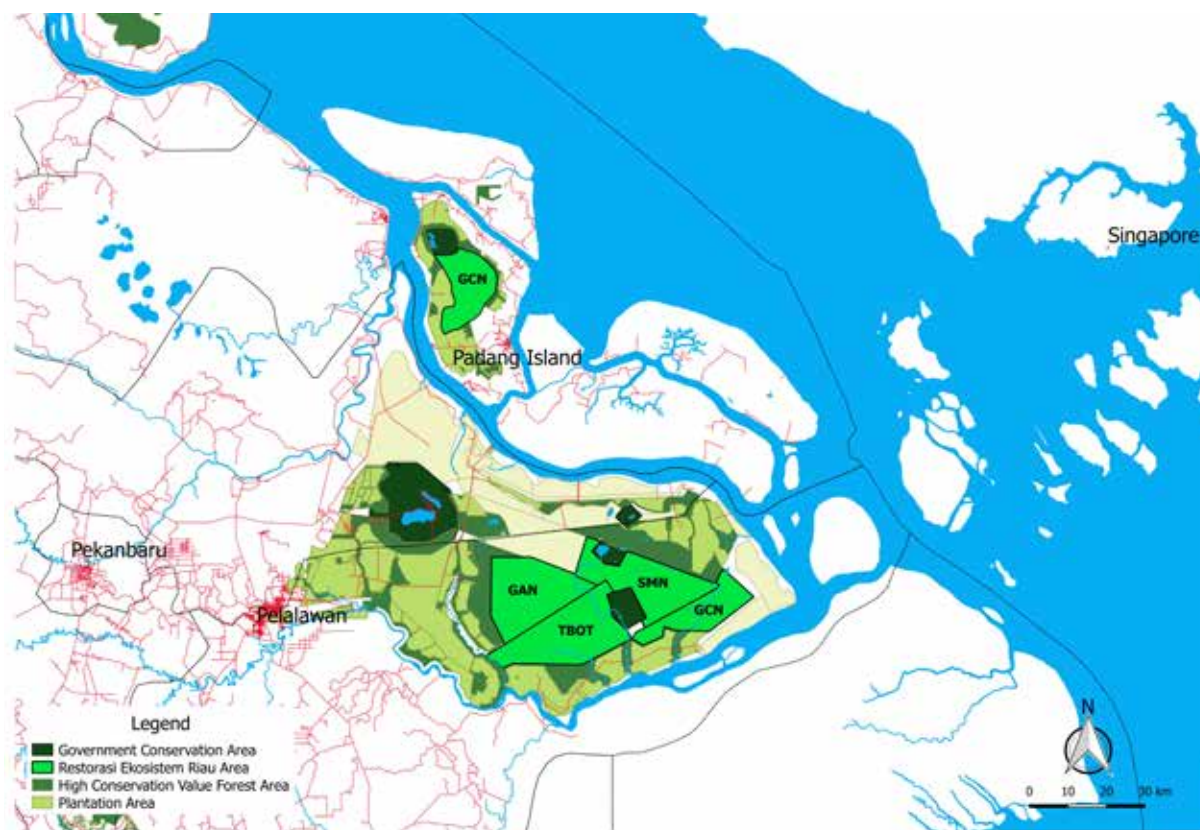
A critical element of the RER initiative is the adoption and maintenance of an integrated production-protection ring landscape model, where plantation operations on the perimeter of the restoration area not only provide protection, but actively fund ecosystem restoration and forest protection. Years of experience have shown that this is the most reliable, consistent and effective economic model for restoration in Indonesia, especially given the extent of the resources that are required for ongoing active management.

APRIL Group implements a 'ring plantation' method as a way to protect conservation forest from encroachment and degradation. Productive Acacia plantations are established on the periphery of our concessions, creating a buffer zone that helps to conserve the interior peat core of raised domes. Plantations deployed in this way make illegal logging and human encroachment less likely.

The plantation ring generates an economic return as well as the resources and employment opportunities to support the livelihood of local

Map 1

150,000 ha of degraded peat forest in Kampar Peninsula and Padang Island, Riau Province, Indonesia.



communities. The ring plantation approach achieves an important balance between renewable plantation, conservation and local economic development.

The ring plantation approach was developed in response to the challenges posed by unmanaged land, which is prone to encroachment and degradation through illegal logging or fire. This managed approach integrates

plantation forest and conservation land as part of holistic landscape management that also includes fire prevention and hydrology management.

The RER landscape is made up of five concessions operating under 60-year ecosystem restoration licences granted by the Indonesian Ministry of Environment and Forestry. The five concessions are:

Kampar Peninsula		Year of licence issuance
PT. Gemilang Cipta Nusantara (GCN)	20,265 ha	2012
PT. Sinar Mutiara Nusantara (SMN)	32,830 ha	2014
PT. The Best One Unitimber (TBOT)	39,412 ha	2014
PT. Global Alam Nusantara (GAN)	36,850 ha	2014
Padang Island		Year of licence issuance
PT. Gemilang Cipta Nusantara (GCN)	20,450 ha	2013

## Kampar Peninsula

The Kampar Peninsula contains one of the last lowland tropical peat forests in Sumatra, a single block of forest that exceeds 344,000 ha (3,000 sq. km) in size.

The importance of the Kampar Peninsula is underlined by the fact that it has been recognised by BirdLife International, The International Union for Conservation of Nature (IUCN), the Wildlife Conservation Society (WCS) and World Wildlife Fund (WWF) as an Important Bird Area (2004), Key Biodiversity Area (2006), and Tiger Conservation Area (2007), respectively.

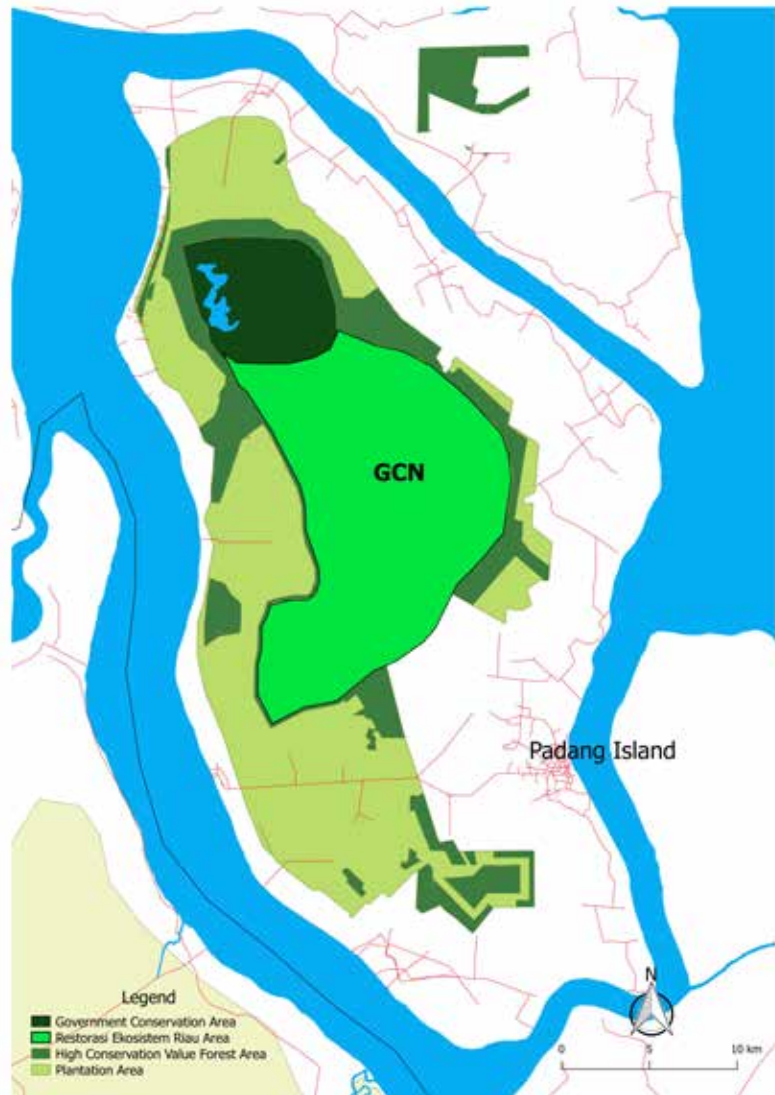


The WCS and WWF estimate the Peninsula is capable of supporting up to 50 tigers.

Furthermore, The Nature Conservancy (TNC) noted last year that the 344,000-hectare block of peat forest in Kampar Peninsula is the largest remaining peat forest in Riau where forestry quality is maintained and is improving, and which provides an important link between the remaining blocks of natural forest in Riau and the Kerumutan Wildlife Conservation area.

RER's contribution extends beyond biodiversity. The work done by our RER teams last year has also had a positive impact on the everyday lives of the communities living in and around the RER area. This includes about 17,000 people living in nine villages on the Kampar Peninsula and another 24,000 in 10 communities on Padang Island. Our teams go to great lengths to ensure that traditional community activities like fishing and the gathering of honey are protected and local businesses are supported.

**Map 2** Padang Island land cover map (2016).



## Padang Island

Padang Island also contains a significant amount of important natural peat swamp forest. In total, 38% (42,156 ha) of the 110,936 ha island is forested. The largest block of this peat forest is within the PT GCN Ecosystem Restoration licence area, totaling 19,878 ha, or approximately 47%, of the natural forest on Padang Island. The remaining natural forest is managed as follows:

- High Conservation Value Forest (HCVF) (9,811 ha);
- Tasik Tanjung Padang Wildlife Reserve (4,952 ha) containing a 650 ha lake, Tasik Putri Puyu;
- Other forest lands (7,039 ha).

Only 541 ha of PT GCN is deforested, consisting of 511 ha of scrub/open area, and 30 ha of agriculture which was present before the licence issuance.

The topography of the island is flat, ranging from a 0-2% slope with elevation reaching 12.6 meters above sea level. Three rivers (Dedap, Mengkopot, and Melibur) have as their source of water the peat forests of PT GCN, and provide fresh water to downstream communities on the east coast of Padang Island.



**Graph 1** Four key elements of RER programme: Protect, Assess, Restore and Manage (PARM)



Although FFI has not yet completed biodiversity surveys within GCN, previous HCVF surveys have documented the presence of 64 species of birds, 25 species of mammals, 8 species of reptiles, and 161 species of plants.

Padang Island has a reported population of 42,118 people (2010) in 21 villages, and GCN is working with 10 communities, with about 24,000 people. Community programmes include clean water provision, no-burn farming methods, fish pond establishment, honey collection, contract employment and service provision, education and awareness programmes with schools and community organisations, employee volunteering, firefighter training, and support for sporting events and religious celebrations.

## Four-element restoration approach

The approach that underpins the management of the RER

initiative has four key elements: Protect, Assess, Restore, and Manage (PARM). As a first priority, the landscape needs to be protected from the risks of new encroachment or degradation. Next is the assessment of the ecosystem and social environment, which informs stage three, restoration strategy and work on the hydrology, native plant and wildlife species. The final step is the continuous process of helping people to utilise the landscape's natural capital to ensure the sustainability of the natural resources within the five concessions.

In practice, all four elements of the approach are occurring or re-occurring simultaneously within RER.

## Partnerships

The RER team has worked with a number of partners that are crucial to the success of the landscape restoration program. Each partner has a specific role and responsibility that directly

guides and addresses the complex challenges of landscape restoration. As the project sponsor, ecosystem restoration concession licence-holder and land manager, APRIL provides financial commitment, leadership, operational resources and technical expertise.

BIDARA is working on building the self-reliance of two rural communities in the Kampar Peninsula (Pulau Muda and Segamai village) that are immediately adjacent to the RER area. Applying an Eco-village model, a BIDARA community officer works to build capacity of individual farmers and community groups to utilise 'no-burn' agriculture practices, organic farming techniques, and animal husbandry.

FFI is completing essential studies related to biodiversity, climate and communities in the Kampar Peninsula and Padang Island. Significant outputs from these studies have included:

- Identification of over 550 plant, animal and fish species





- Quantification of carbon stock
- High Conservation Value Assessments
- Well-being and Ethnography studies
- Conflict Resolution protocol and land tenure mapping

In 2017, TNC completed a scoping phase to help RER establish a landscape management approach for the Kampar Peninsula.

Activities included:

1. Identification of landscape sustainability measures for conservation, production,

human well-being and governance to reflect the fundamental values of other stakeholders on the Kampar Peninsula as well as the management being conducted by APRIL and RER.

2. Completion of a preliminary landscape assessment to evaluate APRIL's production, conservation and restoration investments on Kampar Peninsula relative to the larger forested and non-forested landscape in Riau, with special focus on biodiversity and fire management issues.

## Budget

The annual budget for the RER programme increased by almost 68% in 2017, from US\$3.43 million to US\$5.67 million. Since RER was set up in 2013, a total of US\$18.53 million has been invested in the programme.

### RER Budget (USD) - 2013-2017

No	Description	2013	2014	2015	2016	2017
1	Staff and Related Costs	89,505	125,810	227,706	395,852	547,389
2	Operational Costs	333,301	463,438	507,771	1,146,317	1,083,815
3	Licence and Related Costs	1,013,912	3,309,819	131,838	268,703	2,286,009
4	Partnerships	119,425	218,810	2,863,720	931,174	1,240,273
5	Advisory Board	-	-	8,980	140,881	31,626
6	Capex	-	3,121	6,664	555,737	487,834
<b>TOTAL</b>		<b>1,556,143</b>	<b>4,120,998</b>	<b>3,746,679</b>	<b>3,438,664</b>	<b>5,676,946</b>



In 2017, no hotspots or fires occurred inside the RER concessions, the third year in succession that this has been accomplished

## 02 Protection





70 rangers, including the team pictured here, patrol the RER to prevent illegal logging, encroachment and fire. Since 2015, there were zero incidents

## Fire Prevention

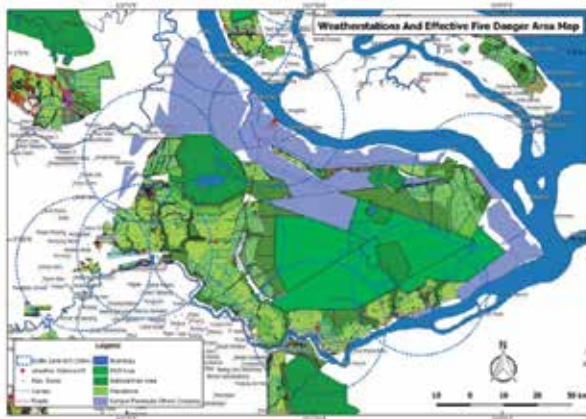
Adopting the successful approach applied by APRIL Group, fire management at RER is based mainly by the fire prevention program supported by an excellent rapid suppression measures should there be any unexpected fire started within RER concessions.

In 2017, no hotspots or fires occurred inside the RER concessions (Maps 3 and 4). This is the third year in succession that this has been accomplished, starting from 2015, one of the worst years for forest fires in Indonesia. This remarkable preventive measures result is due to a combination of factors including:

- RER and RAPP Security posts at each of the main access rivers into the RER concessions.
- On-going socialisation with communities to prevent fires.
- The implementation of APRIL's Fire Free Village Program in all nine communities associated with RER.
- Bidara's Eco-Village program with farmer groups in Sangar sub-village to promote no-burn, intensive agriculture methods.
- MOU Agreement between RER and fishermen on the Serkap River that specifically prohibits the use of fire in RER.
- RER's daily patrols to engage with forest users and fishermen to ensure they do not use fire for land clearing purposes.
- Improved awareness and commitment of the 17,000 community members around the Kampar Peninsula.

Every day, RER Forest Protection teams monitor daily weather from eight weather stations operated by RER and forestry company RAPP, and their joint venture wood suppliers (Map 3). On Padang Island, a total of four weather stations are utilized (Map 4).

Weather data from some of these stations is available from 2002 and includes rainfall (mm), temperature (°C) and relative humidity (%). This information is used to monitor seasonal changes in the weather and compared against natural fluctuations in water table depth, as well as in calculating daily Fire Danger Ratings.

**Map 3** Weather stations on the Kampar Peninsula.**Map 4** Weather stations on Padang Island.

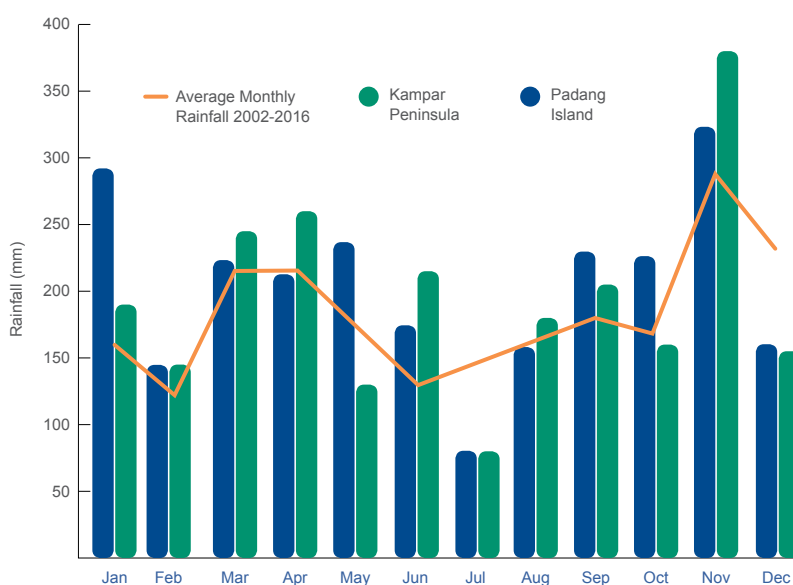
Since 2002, the Kampar Peninsula's total annual rainfall averages 2,159mm, ranging from 1,575mm to 2,578mm. In 2017, total rainfall was 9% above normal at 2,346mm (Graph 2). Monthly rainfall on the Kampar Peninsula ranges from less than 50mm to more than 480mm, averaging 180mm. There are two dry periods each year.

The first dry season occurs from late January to mid-March and the

second from June to September. The wet seasons occur from October to mid-January and again in April and May. It is during these dry periods when forest vegetation may become susceptible to fire ignition, especially where cutting and clearing vegetation for gardens or plantations has occurred. Curiously, since 2008 to 2010, total annual rainfall and the 3-year average rainfall peaked and then steadily declined (Graph 3).

On Padang Island, since 2012 annual rainfall averages 1,884mm, ranging from 1,453mm to 2,482mm. 2017 total rainfall was 32% above normal at 2,478mm. Monthly rainfall on Padang Island ranges from less than 50mm to more than 360mm, averaging 157mm. The dry and wet season periods are similar to those on the Kampar Peninsula.

Fire Danger Ratings (FDR) estimate the likelihood of a fire to ignite and spread, and whether it requires suppression action. Factors like 24-hour rainfall (mm), total rainfall in the last 15-days, number of days without rainfall and the condition of fine fuels are variables used to calculate the daily FDR. By knowing the daily FDR, forest protection teams can inform communities, fishermen and other forest users that vegetative conditions are such that there is a risk of fire. They also use this data to increase patrols and have their firefighting equipment ready for use.

**Graph 2** Monthly rainfall in 2017 on the Kampar Peninsula and Padang Island.



FDR on the Kampar Peninsula was generally lower in 2017 than during the 2015 El Nino event when weather patterns reduced monthly rainfall and numerous fires occurred in Sumatra. In 2017, an average of 22 days per month was calculated as Low Fire Danger Ratings (Graph 4) compared to 2015, when Low Fire Danger only occurred on average 16 days per month. Similar results were observed on Padang Island.

In tropical peat swamp forest, there are no natural causes of fire. Fire occurs when the forest is disturbed through logging and clearing, vegetation becomes dry enough to burn and humans either intentionally ignite a fire for land-clearing or accidentally ignite a fire through improper disposal of cooking fires or cigarettes.

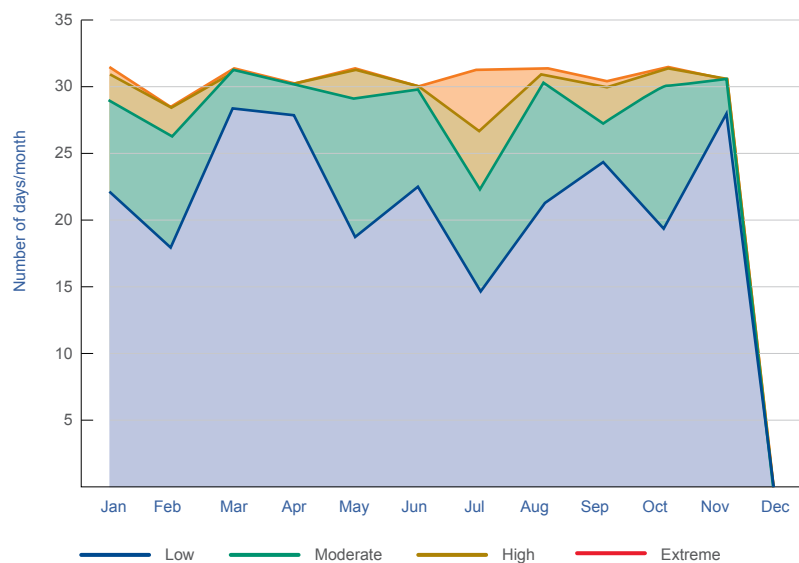
To anticipate the occurrence of fire, not only does RER monitor the weather and calculate Fire Danger, but RER also conducts real-time fire patrols and monitors remotely-sensed Hotspot data. Hotspot data is publicly available online from the NOAA and MODIS satellites.

RER regularly monitors hotspot data to identify points that may be inside or close to the RER boundary. If a hotspot point is observed, the coordinates (latitude/longitude) of the location are immediately transferred to field teams which check the location for any appropriate action.

**Graph 3** Total annual and 3-year average rainfall for the Kampar Peninsula, 2002 – 2017.



**Graph 4** FDR on RER Kampar Peninsula 2017.



**Maps 5 and 6** 2017 Hotspot map for RER on Kampar Peninsula and Padang Island





Zero fires have occurred in the RER area since 2015.



A RER ranger team  
before a patrol

## Fire Suppression

RER is prepared to respond to forest and land fires should they occur. Since 2015, RER has been purchasing specialised forest firefighting equipment that is lightweight for easy mobility and high-pressure water pumps for moving water long distances to extinguish fires. In total, RER has more than 15 water pumps, 3-km of hose and a variety of hand-tools to contain and control forest and land fires. In 2017, RER's forest protection team was the overall winner at the APRIL Firefighter Competition.

Zero fires have occurred in the RER area since 2015. This is the net result of RER's efforts

to monitor weather, prevent fires, and ensure equipment and teams are prepared to suppress fires. This is the longest period of forest recovery that the Kampar Painsinsula has experienced in many decades.

## Resources

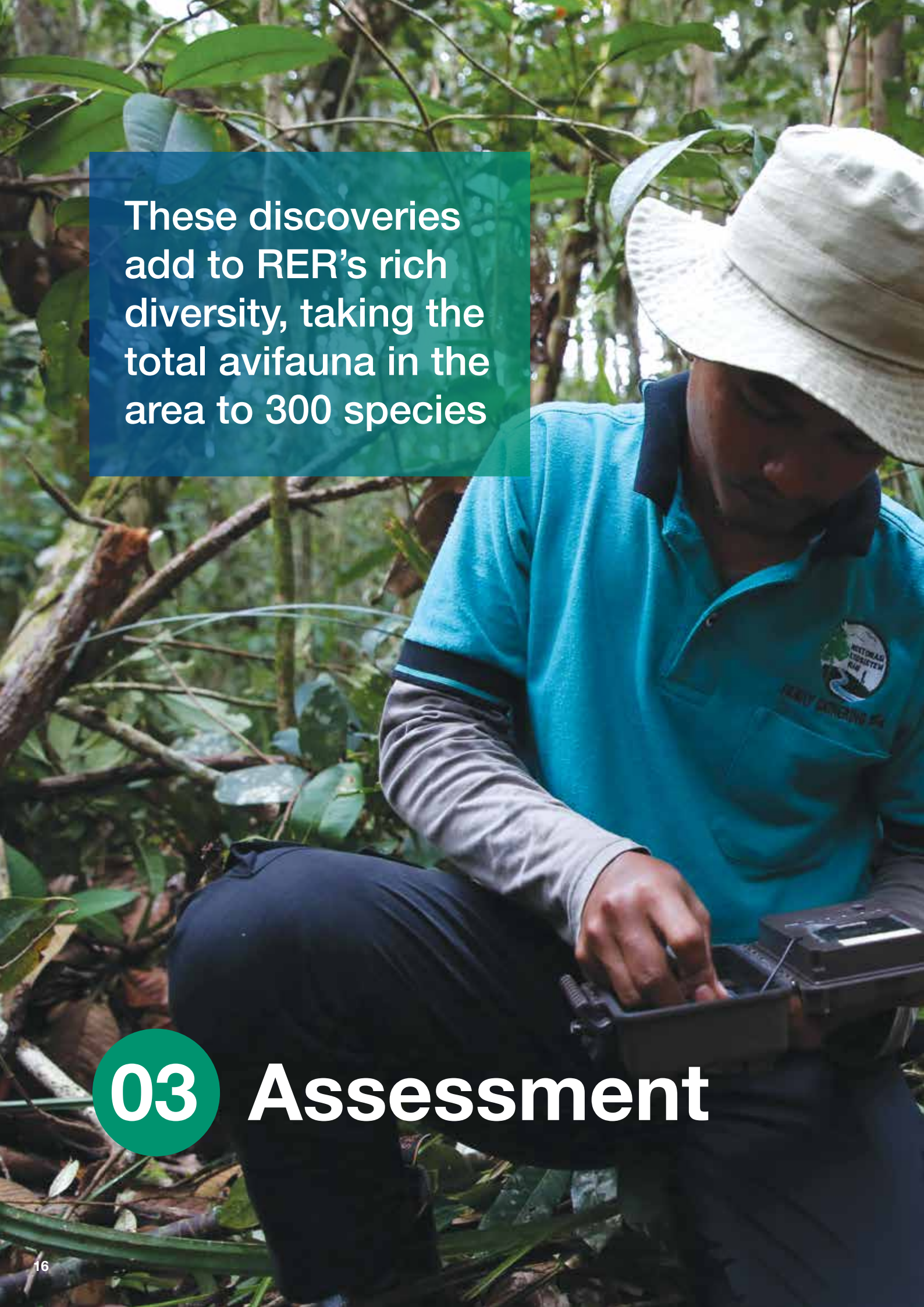
The RER has a total of 69 employees and more than 100 contracted rangers and team members that work to protect and restore the forest every day. Over 80% of RER's workforce is drawn from the two regencies in Riau where RER is located, Pelalawan and Kepulauan Meranti. This helps RER to establish trust and better understand the needs of forest users.

Hotspots are also termed High Temperature Events (HTE) that represent a thermal anomaly occurring within a 1.1 km<sup>2</sup> area which is the pixel resolution of the satellite sensors. The satellite is unable to determine what is causing the thermal anomaly. It is identifying that something hot is occurring within the pixel area as compared to the background temperature and that ground teams should go to the location to investigate.







A researcher wearing a light blue polo shirt with a logo, a white bucket hat, and dark trousers is crouching in a dense forest. They are focused on a small, open black box or container in their hands. The background is filled with green foliage and tree branches. A semi-transparent teal box with white text is overlaid on the left side of the image.

These discoveries  
add to RER's rich  
diversity, taking the  
total avifauna in the  
area to 300 species

**03**

## Assessment





## Wildlife Monitoring

Camera trap surveys were carried out in 2017 to continue to assess the remarkable range of species present in the RER, building on the initial Biodiversity Survey carried out in 2015 by FFI.

The camera traps are a key tool in discovering species in the Kampar Peninsula and Padang Island concessions. From March to October, RER installed a total of 84 cameras over 7,758 nights, capturing 6,310 snapshots and videos that have made possible the identification of up to 52 species of animals.

One of the benefits of using camera traps is their ability to identify hard-to-detect species, such as the Blue-winged Pitta (*Pitta moluccensis*), whose presence inside RER was recently confirmed for the first time in photographs as well as in videos captured by camera traps. Evidence from the cameras suggests that RER has the potential to support breeding populations of the Black Partridge (*Melanoperdix niger*) which have been spotted in pairs (male and female). These discoveries add to RER's rich diversity, taking the total avifauna on the Kampar Peninsula to 300 species.

Another interesting discovery was the Sambar Deer (*Rusa unicolor*). Previous surveys completed by FFI only managed one sighting of this elusive animal and otherwise recorded its presence through its footprints. RER's cameras managed to capture more photos of this particularly large and elegant deer.



**From March to October, RER installed a total of 84 cameras over 7,758 nights, capturing 6,310 snapshots and videos that have made possible the identification of up to 52 species of animals.**

Camera traps play an important role in this process, enabling a far larger area to be monitored

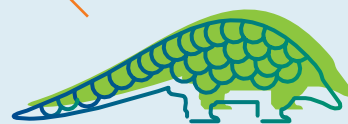
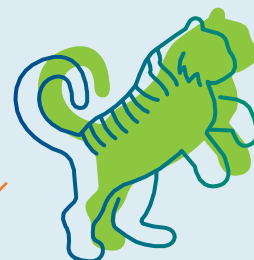
As of December 2017\*, the total plant and animal species identified in RER include:

**718**

species of fauna and flora

**48** globally-threatened species

including the critically endangered Sumatran Tiger and Sunda Pangolin



\* Note: Inventories of species are compiled on an ongoing basis



**70** species of Mammals

including the presence of five of Sumatra's six cat species

**300**

species of Bird



including the critically endangered Helmeted Hornbill

**112**

species of Trees and

**40**

species of non-tree



**107**

Amphibian and Reptile species

including the Malaysian Giant Turtle and Painted Terrapin



**89**

species of Fish





RER is also home to species of wild cats that have been listed as endangered by the IUCN. The Sunda Clouded Leopard (*Neofelis diardi*) - the larger of the cat species in RER - has been detected moving in pairs and research is ongoing to verify if this is a pair of siblings or a male-and-female pair. The Flat-headed Cat (*Prionailurus planiceps*) - a species heavily associated with and reliant on areas near water bodies - has also been spotted. The study suggests it is a single male.



Sunda Clouded Leopard (*Neofelis diardi*), is one of five Sumatra's six cat species with confirmed presence on the Kampar Peninsula.



Two mammals identified on the Kampar Peninsula are listed as Critically Endangered, one of them is Sunda Pangolin (*Manis javanica*).



The Flat-headed Cat (*Prionailurus planiceps*) was captured by camera trap in 2017, the first time this Endangered (EN) wetland specialist has been photographed since 2015.

Total Number of Camera Traps installed across Kampar Peninsula and Padang Island in 2017:

RER Concessions	# of Camera Traps	# Trap nights	# Pictures/Video	# of Species Found
TBOT	32	3678	1903	34
SMN	12	599	291	17
GCN Kampar	25	2566	1903	38
GCN PPD	15	915	2213	10

## Report: Birds of the Kampar Peninsula

In 2017, as part of a series of publications, RER published a second report, Birds of the Kampar Peninsula: An Annotated Checklist, detailing the presence of 299 rare and endangered birds in the Kampar Peninsula peatland restoration forest area and surrounds. This includes the critically endangered Helmeted Hornbill (*Rhinoplax vigil*), listed in the IUCN Red List of Threatened Species.

Compiled by ecologists at RER, the checklist is a record of all the bird species that have been identified as of June 2017. As the first record of its kind to be compiled in the area, it will serve as a benchmark reference for bird life in Riau Province.

The new checklist compiles the results of several biodiversity assessments conducted since 2010 and indicates a significant increase in the number of bird species identified in the area.

The presence of species such as the White-winged Duck (*Asarcornis scutulata*) and Storm's Stork (*Ciconia stormi*) indicate that the threats noted by Birdlife International such as forest clearance, logging, industry and infrastructure development for oil and coal mining, have diminished and land use change has stabilised on the peninsula. RER's forest protection efforts since 2015 have created an environment where avian habitat and populations can flourish.



The striking and colourful Crimson-winged Woodpecker (*Picus puniceus*) makes its way up a tree branch in search of an insect meal. Woodpeckers play an interesting role in creating cavities within trees which in turn can be used by other cavity nesting species to rear their young.





## Waterbird Census 2017

In early 2017, a team from FFI and RER participated in the Asian Waterbird Census (AWC), organised nationally by the Wetlands International-Indonesia Program in collaboration with the Directorate General of Forest Protection and Nature Conservation of the Ministry of Environment and Forestry. The AWC occurs in January each year throughout the Asia-Pacific

region and collects information on waterbird populations and monitors the status and condition of wetlands.

The total number of water birds counted in the RER area during the survey reached 200, comprising seven different species. The Purple Heron (*Ardea purpurea*) was the most common species encountered, with a total of 142 individuals.

In addition to the 200 water birds, 64 non-water bird species were also observed, including iconic bird species such as the White-breasted kingfisher (*Halcyon smyrnensis*), Grey-headed Fish Eagle (*Ichthyophaga ichthyaetus*) and the Rhinoceros Hornbill (*Buceros rhinoceros*).

**64**  
non-water birds



**200**  
water birds



A total of 718 species of flora and fauna have been identified on the Kampar Peninsula

## Landscape Assessment

In 2017, The Nature Conservancy completed the scoping and assessment phase for the development of a land use management plan for the Kampar Peninsula.

TNC identified that the Kampar Peninsula contains over 344,000ha of lowland peat forest, the largest block of peat forest in Riau. Furthermore, the location of this forest is critical to the maintenance of important biodiversity corridors and connectivity between other remaining forest blocks in Riau such as Kerumutan, Riau islands, and Giam Siak Kecil Biosphere Reserve.

TNC noted that, based on preliminary assessment of Leaf Area Index, the quality of forest cover has been maintained and improved from 1999-2016 in the central core area of the Kampar Peninsula.

TNC also identified key stakeholders from government, communities and civil society organizations and recommended that continued support to local communities for improving security and economic empowerment opportunities should be pursued.

Further, all land management stakeholders on the Kampar Peninsula should strengthen partnerships with existing government structures in the Tasik Besar Serkap Forest





48-metres height Greenhouse Gases Flux Monitoring Tower in the area of RER in Kampar peninsula provides high frequency measurement at ecosystem scale.

Management Unit, the section of the local government that manages production forestry. This is in order to identify shared landscape objectives, implement management activities that will protect natural capital and utilize best management practices for sustainable forest and agricultural production; and synergize efforts to monitor important indicators for achieving these objectives.

The assessment concluded that the key to a shared vision for Kampar Peninsula landscape management is agreement among all stakeholders on objectives and indicators, and a phased approach to partnerships.

## Carbon Stock and GHG Flux Measurement

Last year, FFI released a report on estimated carbon stock in RER. The report was based

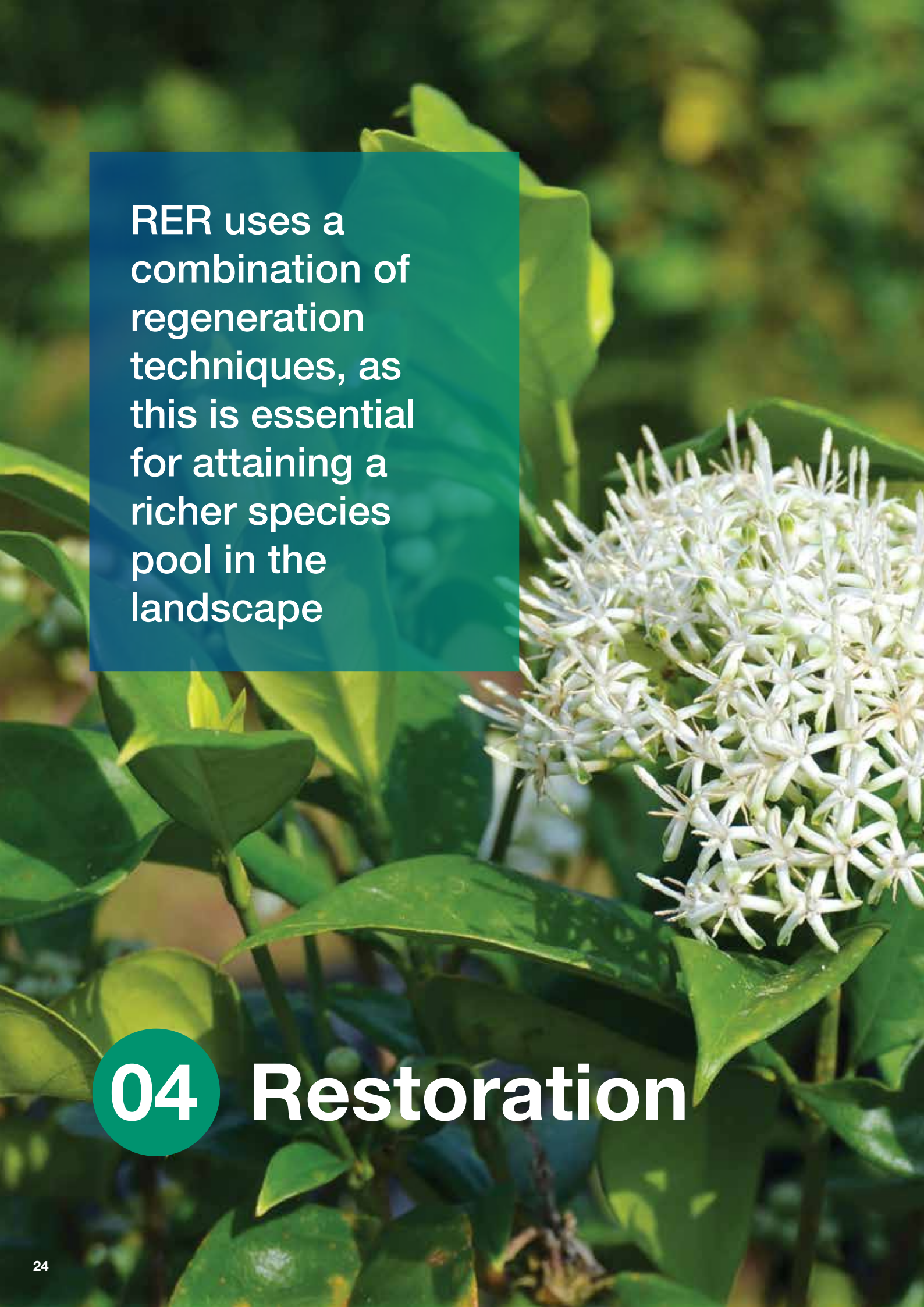
on extensive field surveys in three of the RER concessions in Kampar Peninsula. The surveys were carried out in 2015 within a framework of climate, community and biodiversity assessment.

The carbon stock survey was commissioned to determine both the level of carbon above and below the ground. Peat samples were analyzed for carbon content by an independent laboratory. Remote sensing to identify the land cover classes from satellite images, and to model the peat depth distribution. Based on the analysis, FFI calculated that 98% of the total carbon content of the forest and peat soil is found below ground in the peat soil.

The research was particularly important, in light of the fact that Indonesia holds the largest stock of peat carbon in tropical countries, and the Kampar Peninsula is estimated to contain approximately 2.8-4.6% of the country's estimated below ground carbon pool (Deltares: 2015).

The report stated that 70% of the RER ecosystem restoration concessions (ERCs) located in Kampar Peninsula holds as much as 688,872,434 tonnes of carbon or 2.5 Giga tonnes of CO<sub>2</sub>e. But further assessment is needed to estimate the potential emission reduction in the RER area.

Within the concession of RER PT. Gemilang Cipta Nusantara (GCN) concession in Kampar Peninsula, APRIL Group is collecting greenhouse gases (GHGs) flux data using eddy covariance technique since May 2017. The technique is measuring carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and water vapor (H<sub>2</sub>O) fluxes from a 48-metres height tower as well as automated soil CO<sub>2</sub> chamber for microbial respiration every 30 minutes. Later, the data collected from this site is expected to be able to provide better understanding of GHGs dynamics at ecosystem scale from undisturbed or conservation areas.



RER uses a combination of regeneration techniques, as this is essential for attaining a richer species pool in the landscape

## 04 Restoration





## Tree Nurseries

RER produced over 39,000 seedlings in their nurseries, which contain over 70 different tree species, utilising over 1,900 seedlings on 12.5 ha of degraded land for planting and assisted natural regeneration.

New production in the nurseries came from three sources in the surrounding natural forest:

- Uprooted seedlings
- Seeds that have fallen from forest trees
- Cuttings from a mature tree

The use of uprooted seedlings involves carefully removing individual tree seedlings from the forest floor and placing them in planting bags with soil, to be maintained in a nursery. These seedlings are taken from locations in the forest where abundant seedlings exist, with the intention to plant them in a different location where few trees exist. Collecting tree seeds depends upon the seed production of different trees, which is seasonal, very sporadic and annually variable, and is therefore somewhat unreliable.

Cuttings are more easily obtained than seeds and they replicate the desirable traits, such as growth rate and form, of certain trees. Uprooted seedlings and cuttings are the most common sources of seedlings in RER.

Seedlings remain in the nursery for approximately one year to ensure their roots, stem and leaves are strong and become 'ready-to-plant' 12-18 months later.

Gathering seedlings is a continuous process for the nursery teams, as natural mortality occurs due to transfer shock, root damage, insects or infections.

## Forest restoration

Forest restoration (recovery) can either be through natural or passive regeneration or the active regeneration of trees. Natural regeneration is the most cost-effective approach for recovering biodiversity, ecological processes, and/or ecosystem services under favourable ecological conditions. In general, tropical ecosystems recover rapidly without human intervention and/or the addition of new disturbance such as illegal logging, land-clearing, or fire. Active regeneration requires planting of nursery-grown seedlings, direct seeding, and/or the manipulation of disturbance regimes to speed up the recovery process, often at high cost.

RER uses a combination of both regeneration techniques,

as this is essential for attaining a richer species pool in the landscape. However, natural regeneration dominates because of the high level of forest cover (99%) that exists and RER has biodiversity conservation as its highest priority objective. RER therefore implements an adaptive management approach whereby each annual working area block is assessed on its current condition and a suite of ecological and human factors are considered before applying a management activity.

Active regeneration is used where new, human-caused forest disturbance has occurred and/or where adequate natural

regeneration is not occurring. RER's goal for active regeneration is to establish 400 trees per ha on a 5x5 meter spacing. Six months after planting, a survival check is performed and dead seedlings are replaced.

Planting operations took place in areas described in RER's government-approved 10-year management plan (RKU) and annual work plans (RKT) in PT GCN Kampar and PT GCN Padang Island. Restoration activities in PT SMN, TBOT and GAN will begin in 2018, according to the RKUs and RKTs. The following is a summary of RER's planting and natural regeneration accomplishments:

Year	Planting	ANR	Total (Ha)
2016	17.87	-	17.87
2017	8.48	4.0	12.48
<b>TOTAL</b>	<b>26.35</b>	<b>4.0</b>	<b>30.35</b>



RER produced over 39,000 seedlings in their nurseries, which contain over 70 different tree species.



## Hydrological Restoration

In its natural state, a tropical forested peatland is composed of over 90% water. The source of this water is rainfall, which varies widely from month-to-month (from less than 50mm to well over 400mm) with alternating wet and dry seasons that occur twice each year.

A peatland area is considered to be in a healthy condition if it is actively accumulating peat. Certain plant communities and the locations in which they are found on the peatland are indicative of peat-forming conditions. The accumulation of and loss of tropical peat are controlled by the water table dynamics. The fluctuation of the water table is important to monitor because the seasonality of rainfall affects peat accumulation. It is estimated that undisturbed tropical peatlands with normal rainfall can accumulate 1-3 mm of peat depth every year.

The water table depth in the peat varies seasonally with rainfall, evapotranspiration, and ground water flow. In the wet season, water may be several centimeters above the soil surface. In the dry season, the water table will drop below the surface, as much as 150 centimeters during extended droughts of two months or more.

Prior to 2013, RER concessions experienced decades of commercial and illegal logging, removing individual large trees. To facilitate access, loggers constructed networks of drainage canals that stretched many kilometers from the river banks to locations deep in the forest. These drainage canals range in width from 1-9 meters and approximately 0.5-1.5 meters deep. From these arterial canals, a rail network was constructed to move logs from the forest to the canal, where the logs were then floated out to the river.

RER has documented within its concessions 36 individual old drainage canals, totaling 116 km in length. For the fishermen using the rivers in RER, these canals serve as landmarks and provide some additional access into the forest. The water depth in the canals varies with wet and dry seasons, and they facilitate more rapid water loss from the peat during long periods of dry weather.

This makes the peat forest vulnerable to fire as surface peat and vegetation dry out quickly during the dry season. Fires start due to human carelessness and, more often than not, through intentional fire use to remove vegetation and increase access to fishermen or for agricultural land-clearing.

RER's goal is to restore the hydrology of the peat forest by closing the old drainage canals and restoring water table changes to near-natural seasonal fluctuations. By restoring the water table, the peat forest can re-grow, subsidence will be minimised, fires will be more easily prevented and potential carbon emissions from dry or burned peat will be reduced or eliminated.

### Canal Blocking

The first steps in restoration of drained peatlands is to identify the location of the canals, prioritise the canals for closure, and undertake a survey to determine the slope of each of the old drainage canals on the peatland. This is called profile-levelling the canals. The profile allows water management specialists to see the length and slope of the canal and identify the location where dams should be constructed.

As a first effort, RER aims to raise water levels in 40-cm steps along the length of each canal, essential for establishing a series of terraces that will slow the flow of water and retain peat moisture longer during the dry season. Once the dams are established and water flow is slowed or stopped, natural succession processes can occur to fill in the pool of water behind each dam.



RER has built 25 dams to close nine old drainage canals measuring more than 29km in length in the concessions

RER plans to close all 116 km of canals during a ten-year period beginning in 2016. So far, 9 canals have been closed, totaling 29.5 km using 25 hand-built dams.

Dams are constructed from a variety of materials. Most effectively, sandbags are used at the mouth of each canal where it empties into a river. Each bag weighs 25-30 kgs constructed from a synthetic polypropylene material known as geo-reinfox that is resistant to corrosion and UV light. The bags are layered in a stair-step fashion in order to withstand the weight of the water pushing against the dam. The number of bags required depends upon the width and depth of the canal. It may range from 80-300 bags for a single dam.

Additional dams, if needed upstream in a canal, are normally constructed from strong and sturdy recycled materials such as aluminum pipes and sections of used conveyor belt known as felt, obtained from APRIL's paper mill manufacturing facility. The felt has extremely low porosity, has reached the end of its useful life and causes no environmental harm.

Each of the dams is inspected annually, and can easily be repaired or improved, as RER teams maintain a constant presence and active management of the forest.

### Water Level Monitoring

Following canal blocking with dams, it is necessary to

monitor the water table and the effectiveness of the canal blocking programme.

A series of dip-wells are inserted on the peatland to monitor the water table. Wells are located in parallel transects perpendicular to the drainage canals and along transects that cross a range of peat topography from rivers edge to peat dome. Water levels in the well are measured monthly to monitor the water table below the surface of the peat. Peat subsidence is also monitored at many of these same locations.

For example, in RER's PT TBOT concession on Kampar Peninsula, ten water table monitoring points along a 5-km transect in an area of natural forest without canals





Sandbags dam are the most common construction to block the old drainage canals within RER to restore water table changes to near-natural seasonal fluctuations

began in July 2016. From July-October 2016 the water table was 50 to 100 cm below the peat surface, but quickly recovered to the peat surface in November 2016 when over 400-mm of rainfall occurred. 2016 annual rainfall was 6% below the 14 year average for the Kampar Peninsula, and this followed 2015, when annual rainfall was 29% below normal due to El Nino weather pattern.

However, the 2017 rainfall was 9% above normal and well dispersed throughout the year, enabling water tables to remain high, ranging from only 40-cm below the surface to 50-100 cm above the peat surface. In this instance, the frequency and

abundance of rainfall is a primary driver for maintaining water table levels close to the peat surface and when long or extended droughts occur, water table depth will continue to decline below the peat surface until rainfall resumes.

RER's water table monitoring programme continues to expand each year as the work of canal blocking continues. Currently, there are over 43 peat water table monitoring points in RER, of which 28 are also for subsidence monitoring.





With over 40,000 people living in and around RER, the project teams invest considerable time and resources to working with the local communities to ensure that traditional activities are protected

## 05 Management





The farming programme has been set up to provide communities living around RER with an alternative method of land preparation that can produce valuable food crops, like red chilli

## Community Relations

With over 40,000 people living in and around RER - 17,000 people in Kampar Peninsula and 24,000 on Padang Island - the project teams invest considerable time and resources to working with the local communities to ensure that traditional activities - like fishing and the gathering of honey - are protected, small businesses are supported, and that people are informed about the importance of the environment and biodiversity conservation. In 2017, community initiatives led or supported by the RER included the following:

### Riau Forest Honey (*Madu Hutan Riau*)

In 2017, RER began partnering with local honey harvesters from the Kampar Peninsula and Padang Island. The honey harvesters are ethnic-Melayu people with long-standing ties to the peat forests of Riau. For generations, they have harvested honey in traditional ways by free-climbing giant forest trees known as Sialang (*Koompassia excelsa*) to collect honey for their own use and sell or trade to others in their community.

Local communities regard the Sialang trees as a protected tree species and collection of Sialang honey is a long-standing cultural and family tradition that involves significant skill, bravery and ethnic ritual. Honey collection is a seasonal activity that varies from year-to-year, based upon weather and health of the forest, so production quantities can fluctuate.

The Sialang trees are relied upon as a source of income for local villagers, but often exploited by agents who purchase large quantities of honey and re-sell at higher prices, pocketing the profit, without sharing with the local community. RER is working to assist the honey harvesters and the communities in which they live by purchasing honey, marketing and selling the product as Madu Hutan Riau, and returning the profits back to the community in the form of projects or infrastructure that all can share and benefit from.

Madu Hutan Riau is natural raw honey that is directly extracted from Sialang tree beehive. The honey ranges in color from light red to black and is triple strained through a combination of rattan and mesh screens: once in the forest and twice more before bottling to remove wax, bee wings and other unwanted solids. No cooking, pasteurisation or sterilisation is used.



Riau Forest Honey is the natural and organic honey traditionally collected from the lowland tropical rainforest in Kampar Peninsula and Padang Island, Riau Province, Sumatra. The 65 families that collect honey collaborate with RER teams.

The Sialang tree is a majestic and iconic wild tree that grows in lowland tropical rainforests near the Equator in Southeast Asia. Its base can exceed two meters in diameter and it is the tallest tree species in the forest, often reaching a height of 80 meters. The Asian giant bee (*Apis dorsata*) is the largest honey bee species in the world and develops large hives of forest honey on the underside of Sialang tree branches which extend broadly and can exceed 50-cm in diameter. The bees collect pollen from hundreds of different sources in and around the forest, creating the unique nectar which defines the distinctive taste of natural, raw Sialang forest honey.

RER's Madu Hutan Riau is becoming a more popular and well-known product that supports local honey harvesters to protect, restore and sustainably utilize the forest; contributes to improving the

well-being of communities through profit-sharing; and provides health benefits to the many consumers who purchase Madu Hutan Riau.

### No-burn vegetable farming

RER works with villagers in Sangar sub-village and Segamai village on Kampar Peninsula, and in four villagers on Padang Island, to support no-burn vegetable farming. The farming programme has been set up to prevent the fire risk from the common practice of slash and burn farming and to provide the communities living around RER with an alternative method of land preparation that will produce valuable food crops.

The communities are initially provided with seedlings of mainly vegetable crops such as red and green chili, red ginger, eggplant, tomato, cayenne and green beans together with equipment and supplies like hand tools and fertilisers. A field school is

organized regularly as a learning platform for the community to discuss problems and improve techniques for crop productivity.

By 2017, in Sangar sub-village, where the program is delivered by RER partner, BIDARA, 3.5 ha of land had been already cultivated with a variety of vegetable crops. Red chili is currently the most attractive crop, generating significant income for 18 households who are members of the Maju Bersama farmers group.

In Padang Island, RER also works with Laskar Alam to assist farmer groups in four villages with demonstration plots for horticulture. Each group of farmers currently manages the planting and harvesting of chili, cayenne peppers and tomatoes. In 2017, through several cycles of harvesting, the demonstration of no burn farming successfully generated additional income for all four villages.





RER provided a 75-meter deep well and 1,000-liter storage tank to serve 50 families in Mayangsari Village to improve the wellbeing of the residents of Pulau Padang by providing the community with clean water and sanitation facilities.

## Water wells

The clean water wells programme is part of RER's commitment to supporting increased living standards and a healthier environment among the communities in the areas in which it operates. The programme is also in line with Sustainable Development Goal 6: Ensure access to water and sanitation for all.

On Padang Island, following the building of the clean water unit in Lukit village in 2016, a unit was provided for the people in Mayangsari. On average, 50 households per village have benefitted from clean water facilities provided by RER. The facility at Mayangsari village has a storage capacity of 1,000 liters from a 75-meter deep well. The households living within a one kilometer radius of the unit

can freely access the facility 24 hours a day as a primary source of clean water for drinking, bathing and washing.

## Volunteering

RER last year organised employee volunteering (EV) programmes in four villages located near the Padang Island concession area for a week as part of its community engagement strategy. RER teams worked together with the communities, including students and teachers from all of the villages to help develop public facilities such as schools, religious places and village offices.

The teams planted trees in areas around the public facilities, painted the buildings, and rolled out a healthy lifestyle campaign



RER will continue to work closely with community members to achieve their goal of self-sufficiency and livelihood improvement in harmony with restoring peat forest.

in the villages. Through these volunteering programmes, RER seeks to increase good relationships with the communities and to promote awareness of the operations and benefits of the RER programme.

## Support for local fishermen

Prior to the advent of the RER, local fishermen who had traditionally fished on the Serkap River were known to sometimes adopt unsustainable fishing practices. For example, some fisherman used electric shocks and/or poison to catch fish, which risked the healthy aquatic life in the river. Similarly, for even easier access to the river, they used to burn the pandan vegetation on the riverside which sometimes led to fire incidents resulting in damage to the fishermen's huts and forest degradation.

RER is now working with a group of 21 local fishermen - Serkap Jaya Lestari - who fish on the Serkap River. Through a mutual understanding, the fishermen can still access the Serkap river, partly within the PT TBOT concession, by agreeing to refrain from illegal activities (e.g.: illegal logging, destructive fishing) and reporting their catches to the RER rangers.



The RER team is committed to collaborating with local communities to assure their well-being now, and also manage the forest and fisheries resources for the benefit of society in the long-term.

## Engagement

In 2017, RER leaders spoke at and attended a number of forums and events to help promote the achievements and share key insights. Some of the events that were attended included:

### **September 2017: Learning from Landscapes Practitioners Retreat - Kalimantan, Indonesia**

Two RER representatives gathered with 32 conservation and restoration practitioners in Setulang village, North Kalimantan, to exchange experiences and challenges at an event facilitated by Tanah Air Beta Foundation and James Cook University. Over the five-day gathering, RER presented a case study on the team's experiences in managing and restoring the peat forest in the Kampar Peninsula and on Padang Island. During the retreat, participants quantified the factors that prevent landscapes in Indonesia from functioning as well as possible, while discussing what sets the Landscape Approach apart from other methodologies.

### **October 2017: 4<sup>th</sup> International Wildlife Symposium 2017 - Banda Aceh, Indonesia**

Joining over 200 conservationists and academics at the Syiah Kuala University, this is the second time RER has been represented at this event, co-hosted by WWF Indonesia. RER discussed three topics in relation to wildlife monitoring on the Kampar Peninsula, namely: the birds of the Kampar Peninsula; baseline data on fish catches by local fishermen's group; and a modified approach to set up wildlife surveys in difficult terrain.

### **November 2017: Responsible Business Forum 2017 - Singapore**

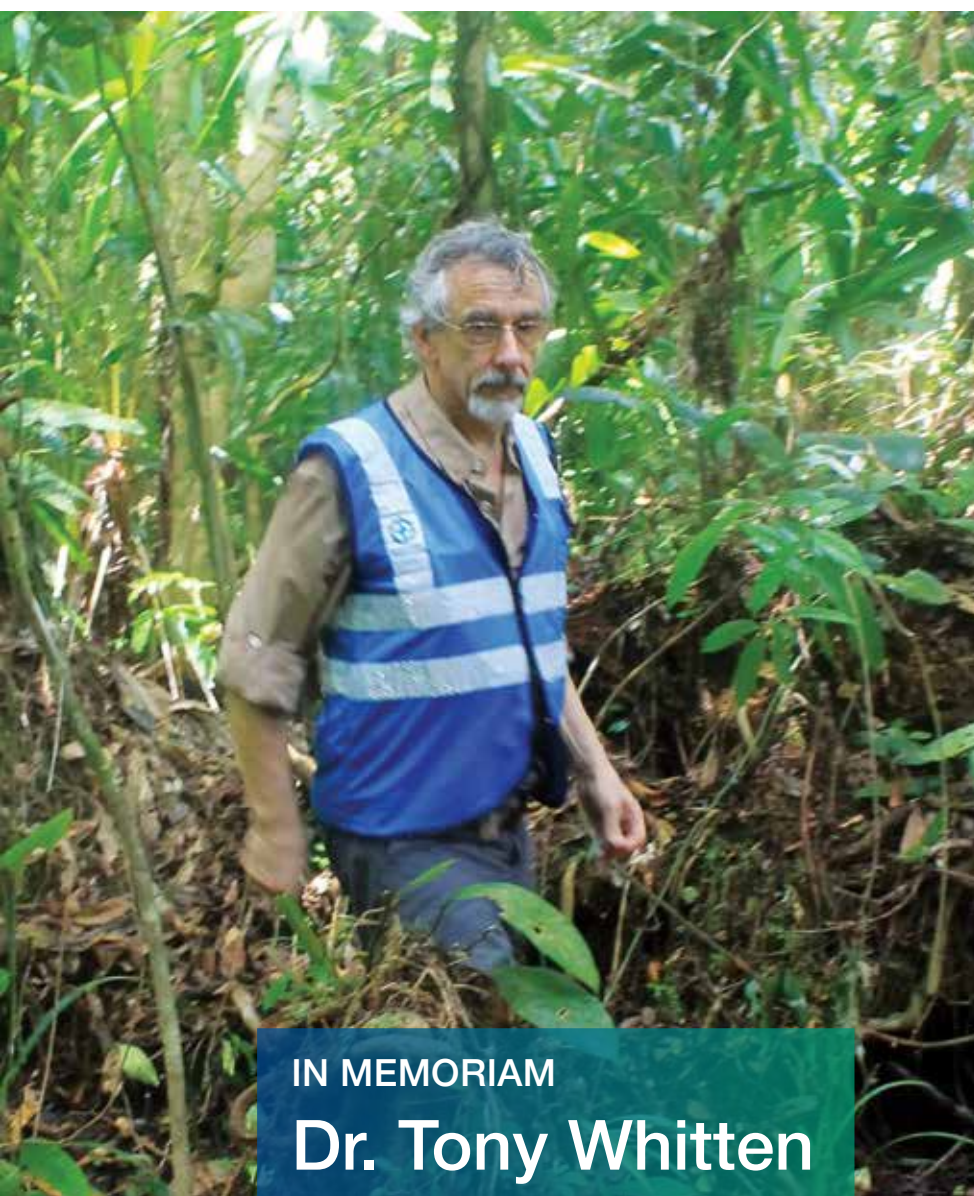
The RER Head of Operations, Brad Sanders, spoke at the Responsible Business Forum in Singapore about the RER project and how it contributes to Sustainable Development Goal 15: Life on Land. In front of a business audience, Mr. Sanders talked

about the significance of RER from the perspective of the landscape: biodiversity, people and climate emphasising the fundamental needs of partnerships, the long term approach of production - protection landscape and funding support for a successful peatland ecosystem restoration.

### **December 2017: 8<sup>th</sup> Asian Wetlands Symposium - Tokyo, Japan**

Attended by more than 290 participants from 29 countries around the world, the symposium is a regional forum to share knowledge, wisdom and practical experience in the areas of conservation, sustainable management and the wise use of wetlands in Asia. RER displayed posters showing the range of biodiversity in the Kampar Peninsula, as well as details about recent observations of an endangered species present in the RER area. The RER presence was significant as there was limited representation of peatland issues at the symposium.





IN MEMORIAM

**Dr. Tony Whitten**

Conservation Champion,  
Advisor, Friend



**Restorasi Ekosistem Riau,  
in Sumatra, Indonesia, is perhaps  
home to some of our best and  
most cherished memories of him.**

### **From Restorasi Ekosistem Riau**

Like so many in the conservation community around the world, we are still coming to terms with the loss of our friend and advisor, Dr. Tony Whitten. This feeling of loss was beautifully articulated by his colleague, Ros Aveling, at Fauna & Flora International (FFI) in a moving obituary that reminded us just how much Tony contributed to conservation and to so many colleagues and projects over a brilliant career.

We are going to miss him greatly and we extend our sincerest condolences and heartfelt thoughts to his friends and family, as well as his colleagues at FFI.

We were fortunate to be one of the many organisations uplifted by the same 'irrepressible optimism, a thirst for knowledge' that Ros wrote about. Our ecosystem restoration project, Restorasi Ekosistem Riau, in Sumatra, Indonesia, is perhaps home to some of our best and most cherished memories of him.

Under Tony's leadership, FFI have been working with RER since 2013 to establish baselines for biodiversity, carbon and community aspects. Under his practical field knowledge, the FFI team has been providing advice on strategies to ensure the long-term protection and management of the area.

From the beginning, Tony was our guide and mentor, inspiring us with his energy and zeal. His expert knowledge of Indonesia's biodiversity equipped him with a strong and practical realism when it came to carrying out assessments, developing management activities, and working tirelessly to compile reports, network and connect team members with colleagues, and peers around the world.

His commitment to conservation was absolute and pure. On each visit to RER he was always so excited to learn about what was happening in the forest in great detail, and especially if we had any new sightings of plants or animals. He was also strongly loyal to the people he referred to as the heroes of the RER project, which was his way of describing the teams that spend days and weeks transecting the forest to assess and record its rich biodiversity.

In February 2017, Tony visited the Serkap River inside the restoration area. He had just completed nearly 24 hours of travel from the UK to reach this remote location and he was grateful to be back in the forest and use his beloved drone that he so judiciously packed and brought with him. We could hear the excitement in his voice once the entourage arrived at the river.

As we travelled upstream, we found a place to dock at a fisherman's old pondok, where he proceeded to unpack his drone. Tony's tall, lean and fit



## His commitment to conservation was absolute and pure.

body cautiously exited our small, wobbly boat and he climbed up on to the even more rickety pondok, at great risk of falling into the river.

He carefully removed all the parts of the drone from its case, meticulously preparing it for flight. We all watched with anticipation before he announced with sigh of frustration that he was missing a cable to connect the drone's control box with his mobile phone. We all frantically searched our backpacks for a cable, but to no avail.

Finally, someone found a cable but it was the wrong kind, so the opportunity was lost. "Do you have your cable?" has now become a frequent joke on our visits into the forest, and while Tony was so disappointed at the time, he continued to recall the episode with great humor.

He was one among a rare breed of people dedicated to conservation science, while at the same time capable of being enraptured by the beauty of life, music, arts and people. When sharing stories about his conservation cruises or visits to forests, he would literally catch his breath in excitement when talking about his discoveries and the encounters he had had with people, especially with the local communities.

In a recent podcast with RER, Tony said that he had been working in Sumatra's forests for over 40 years. And by this, he didn't mean occasional visits and distant research. He lived in Indonesia for more than 10 years, five of which were in Sumatra. He said he was working with RER "to contribute to something which is important now, and is recognized by many as important 10, 20, 30 40, 50, 60 years on, (when) the significance of what was started five years ago will truly be known."

Along with all the many people Tony collaborated with across Southeast Asia to advance conservation and biodiversity projects, we will miss him greatly. We have lost a skillful advisor and true champion of conservation, but most of all we have lost a friend whose enthusiasm and energy had a lasting influence on the way we think about conservation and how we interact with the landscape.

It's been often said that there are people we meet, and there are those that truly touch us. Tony belonged to this latter group. And we can only count ourselves fortunate for this honour of having known this great man. Our work at RER to protect, restore and conserve forests and wildlife will be forever inspired by his memory.







[www.rekoforest.org](http://www.rekoforest.org)



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Restorasi Ekosistem Riau (RER)