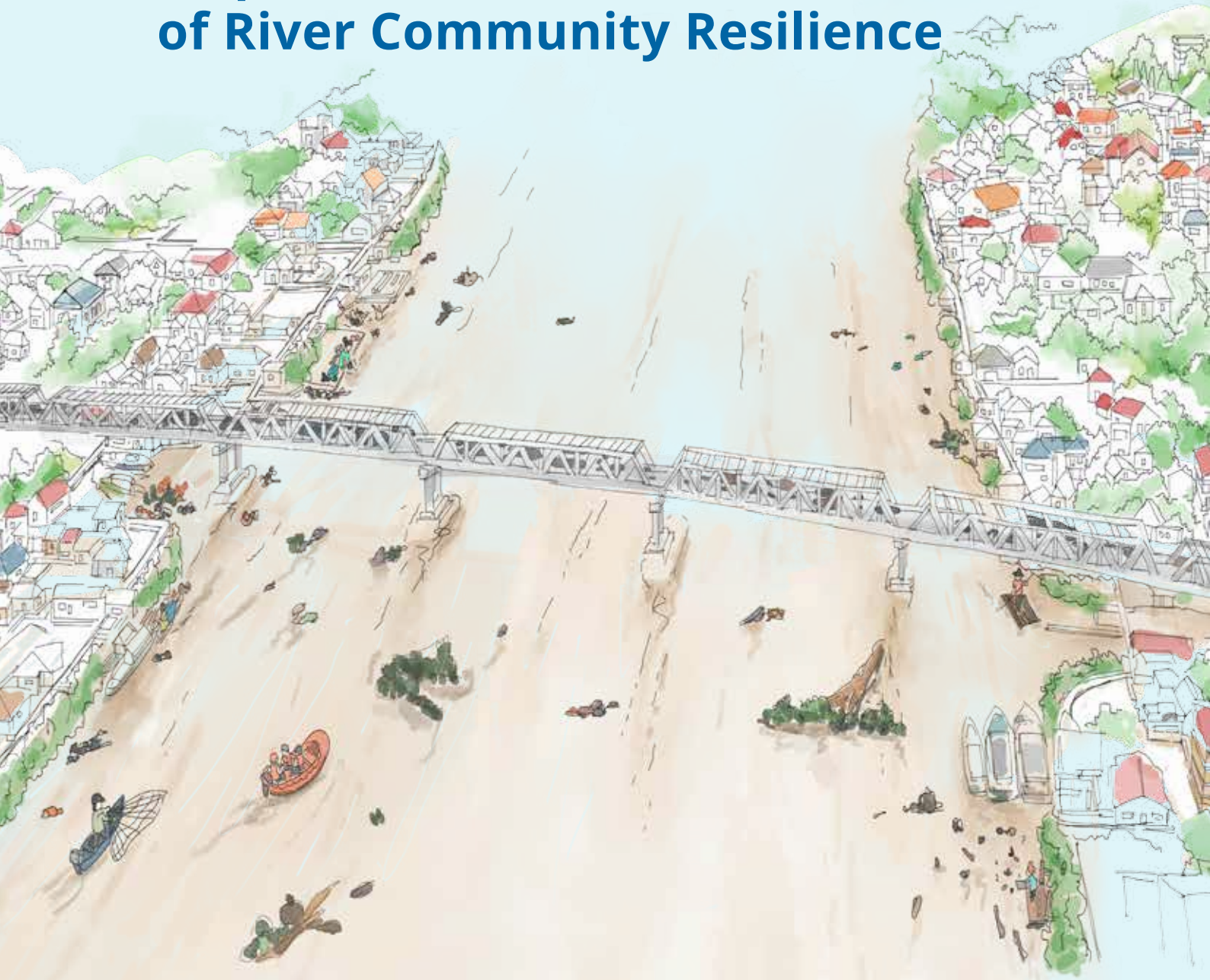




Australian Government

The River Community SPEAKS

Inspirational Stories of River Community Resilience



**The River Community Speaks:
Inspirational Stories of River Community Resilience**

Executive Producer:

Dra. Prasinta Dewi, M.A.P., The Deputy of Prevention, the National Disaster Management

Editor-in-Chief:

Drs. Pangarso Suryotomo, The Director of Preparedness, BNPB

Writer:

Idha Saraswati, SIAP SIAGA

Contributor:

Anton Muhajir

Denty P. Nastitie

Didit Haryadi

Imung Yuniardi

Rendra Oxtora

Firza Ghozalba, BNPB

Hadi Sutrisno, BNPB

Iis Yulianti, BNPB

Melissa Aprilia, BNPB

Tasril Mulyadi, BNPB

Photo contributor:

Anton Muhajir

Denty P. Nastitie

Didit Haryadi

Imung Yuniardi

X23 Rescue Bojonegoro Community

Mat Peci

Pokdarwis Kebomlati Tuban

Rendra Oxtora

Sangsakha

Editor:

Safriza Sofyan, SIAP SIAGA

Kristanto Sinandang, SIAP SIAGA

Fredy Chandra, SIAP SIAGA

Benedicta R. Kirana, SIAP SIAGA

Janggam Adhityawarma, SIAP SIAGA

Designer: Yohanes Cahyanto Aji

Illustrator: Ridwan M. Iqbal

Directorate of Preparedness

Deputy for Prevention

BNPB

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THE RIVER COMMUNITY SPEAKS:

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Preface



TNI Lieutenant General Suharyanto, S.Sos., M.M.
Head of the National Disaster Management Agency

Indonesia is one of the many countries at high risk of natural disaster, such as flood, landslide, extreme weather, volcanic eruption, earthquake and tsunami. In 2022, 3,531 natural disaster events were reported by Subnational Disaster Management Agency (BPBD). The global phenomena of increasing of hydrometeorological disaster events requires strong commitment from stakeholders including government, civil society and international entities.

Over the decades, we have observed an increase in the frequency and intensity of disaster events associated with climate change. The changing of climate variables and human influence on the environment have only exacerbated the matter.

Under the Global Platform for Disaster Risk Reduction 2022, Indonesia has adopted multistakeholder engagement through a pentahelix approach, to achieve sustainable resilience collaboratively. Actions have been taken to implement the Sendai Framework for Disaster Risk Reduction (SFDRR 2015–2030) including prevention, preparedness and mitigation. Those actions are essential to reduce disaster risk, particularly in the phase of pre-disaster or shocks.

Public participation is fundamental for disaster management. Both community and authorities in disaster-prone areas need to see themselves as actor, or ‘subject’. Whether by participation in individual and family-level preparedness, or community participation in the society more broadly.

Disaster Preparedness Day is one of the strategies to achieve both the national development agenda and SFDRR’s goals, which are to decrease disaster impact significantly through; 1) understanding the risk; 2) disaster risk governance; 3) investment and 4) preparedness for better emergency/crisis response.

In the national gathering of the river communities at the National Disaster Preparedness Day 2023 March, we heard the challenges faced by River Basin Area local champions and their best-practice responses, and have decided to document these stories in an anthology of the river activists of Indonesia. *The River Community Speaks: Inspirational Stories of River Community Resilience* (Masyarakat Sungai Bertutur: Kumpulan Kisah Inspiratif Ketangguhan Komunitas Sungai) is the documentation of the river basin communities’ skill and knowledge development to protect the river basin landscape and ecosystem.

In the social context, their stories reveal how those communities have built strong and solid connections among those most at risk along the river-basin landscape to protect and conserve their river resources. The book presents the remarkable story of communities on the river and their initiative, resilience and spirit to cope with any circumstance.

I hope that through these stories, stakeholders are able to absorb wisdom and learning from the disaster risk reduction efforts of each river basin. This book is hoped to inspire stakeholders and other communities to build resilience and reduce disaster risk further.

I would like to send thanks to all communities, BPBD, government, academics, activists, business, journalists and the volunteers for their support and collaboration through Disaster Preparedness Day 2023. I also appreciate to the writing team, contributors and editor who have been involved in the production of this book. This book is a continuation of a previous series, *The Volcanic Community Stories* (Masyarakat Gunung Berapi Bertutur).

With hope that the efforts from all stakeholders to protect people and to reduce disaster loss will meet success, may God bless all of us in this mission.

For resilience and humanity,
All set for safety,
Jakarta, September 2023

Preface



Dr. Raditya Jati, S.Si., M.Si.

The Deputy of Systems and Strategy,
the National Disaster Management Agency

Following the publication *Volcanic Communities Stories*, BNPB has produced a similar publication in a different area: *The River Community Speaks: Inspirational Stories of River Community Resilience*.

This initiative is a form of appreciation to the communities living in the River Basin Areas (DAS) in various provinces in Indonesia who have demonstrated collective actions and local wisdom in protecting the environment and building sustainable resilience to disasters, climate crisis and hazardous development. The importance of the community's role in community-based disaster risk management (CBDRM) is becoming a focus of attention. This book is a valuable source of inspiration and learning for communities living in river basin areas and other regions in Indonesia, given that resilience is local and community based.

BNPB launched the river community stories book during the commemoration of Disaster Risk Reduction Month (DRR Month) on October 2023 in Kendari, Southeast Sulawesi to convey the message of 'Strengthening Local Independence towards Sustainable Resilience'. Communities living in disaster-prone areas should be empowered to implement community-based disaster risk management; each story in the book reflects the key roles of volunteer and community education in protecting the environment, and wisely managing natural resources to ensure their livelihoods.

BNPB is committed to curating good practices in community-based disaster risk management so that they become knowledge products for dissemination to all stakeholders.

The community stories and testimonies shared in this book are evidence of the successful implementation of global agreements for disaster risk reduction, climate change adaptation and sustainable development, which are the foundations for application of sustainable resilience at the community level. The communities' actions and experiences from the stories of people living in river basin areas can hopefully drive government to further encourage policy formulation, program planning and development that empowers community without creating new risks.

We would like to express our sincere gratitude to the Australian Government for its support and cooperation in the field of Disaster Risk Management through the SIAP SIAGA Program. This support not only helped the development and launch of this book but also encourages concrete steps towards growing community resilience in Indonesia.

We hope that this book will not only be an inspiration, but will motivate readers to take part in efforts to protect the environment and to build community resilience in their respective areas. Together we can create a safer, more sustainable and more hopeful future.

Salam Tangguh,
Jakarta, October 2023

Preface



Dra. Prasinta Dewi, M.A.P

The Deputy Prevention, the National Disaster Management Agency

Thanks be to Almighty God as it by His Mercy and Grace that we are blessed with good health to carry out our humanitarian missions amid the dry season.

Through the National Disaster Management Agency (BNPB), the Government of Indonesia has declared 26 April as Disaster Preparedness Day (*Hari Kesiapsiagaan Bencana* (HKB)). BNPB has initiated HKB to raise the community's awareness of the importance of disaster knowledge and risk understanding, to build disaster preparedness culture and to increase skill of self-safety and public rescue.

The date of 26 April was chosen to commemorate the enactment of Disaster Management Decree No. 24/2007 the first regulation framework to shift the paradigm in disaster risk management in Indonesia from responsive to preventive.

BNPB is committed to hosting Disaster Preparedness Day movement every year. This has continued since 2017, which brings us now in 2023 to the seventh year, with the theme of 'Ready to be safe', and the sub-theme 'Build Village Resilience, Reduce Disaster Risk'.

I would like to thank the Australian Government through the partnership program SIAP SIAGA for the attention, commitment and contribution to these collaborative efforts. I convey appreciation to all entities who have supporting and contributed to *The River Community Speaks: Inspirational Stories of River Community Resilience*. The book presents the inspiring stories of the communities who live in harmony with the River Basin Area and shows their initiative, resilience and willingness to tackle any obstacle.

Each story presented in this book is a reflection of the hard work, collaboration and strong determination of communities who seek to protect and care for their environment. They face threats such as river pollution, climate change and economic pressures, but remain determined to protect and restore the rivers that are an important part of their identity. Hopefully this book can inspire all of us to reflect on our role in protecting the environment and encourage us to be actively involved in environmental conservation efforts. Together, we can change the future to be safer and more sustainable.

For resilience and humanity,
Jakarta, September 2023

Foreword



Ms Penny Williams PSM

Australian Ambassador to Indonesia

The Australian Government is delighted to have supported the National Disaster Management Agency (BNPB) with this book, *The River Community Speaks: Inspirational Stories of River Community Resilience*. The book was developed through the Australia-Indonesia Partnership for Disaster Risk Management (SIAP SIAGA program). The book captures local wisdom and good practice from communities living near 5 major rivers across Indonesia.

The book highlights the Government of Indonesia's success in promoting community-driven disaster preparedness and sustainable resilience. The lessons and insights it presents are important for policy makers as they plan watershed management and restoration programs. It is my hope that this book will help foster an exchange of knowledge, experience and lessons learned.

The experience and lessons shared in this book provide examples and insights for replication in other parts of Indonesia. These include the importance of community education and volunteerism to preserve water catchment areas, the benefit of collective action to improve and protect water catchment areas, and the positive impact of preserved water catchment areas on surrounding watershed community livelihoods.

Australia's International Development Policy highlights the importance of disaster risk reduction, and we are pleased to partner with the Government of Indonesia to address disaster risks that affect our region. The book complements disaster risk reduction and sustainable development frameworks adopted by both Indonesia and Australia, including the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030, the Paris Agreement and the Sustainable Development Goals.

I wish to extend my heartfelt appreciation to BNPB for its efforts in documenting, curating and sharing knowledge about the local resilience of riverine communities. The launch of this book in October 2023 is part of Australia's contribution to National Disaster Risk Reduction Month events in Kendari, Southeast Sulawesi.

Prologue

The Community's Resilience and The Sustaining Movement of River Restoration

Dr.Ing. Ir. Agus Maryono
Vocational School Gadjah Mada University



“We honour the water, we preserve the river”

(The Declaration of Indonesian River Restoration Movement, Yogyakarta 2014)

The Indonesian River Restoration Movement or GRSI emerged as an answer to the anxiety and concerns of all people encouraged to care for the rivers in Indonesia, which have been neglected and continuously exploited. Healthy rivers are needed now more than ever as our need for water for agriculture, plantations, fisheries, drinking water, clean water and energy also grows.

Many rivers around Indonesia are being exploited and their quality and quantity are degrading. Rivers are used as dumping sites for rubbish and waste by industry, communities, hospitals, hotels, restaurants and others. Rivers are also continually exploited for their sand, gravel and stones to meet the demands of infrastructure development.

The riverbanks are being transformed into roads, housing, and have become settlement areas. Furthermore, river systems have also been truncated to make way for hotels, housing and shops. In fact, the river ecosystem and its borders house millions or even billions of creatures: flora and fauna, micro- and macro-organism, all of which depend on the river ecosystem. They have also become victims of river exploitation.

The exploitation of the river increases the likelihood of flooding and landslides, but the solution has been to channel-straightening the river, building concrete over it, destroying its ecosystem. A technocratic approach to disaster mitigation with little participation from affected communities only further marginalises people who already lack information about the natural disasters around them. Marginalised groups who live at the rivers bank, for example, inevitably consume poor quality water. Moreover, they have to face floods without knowledge of resilience or disaster mitigation. With this limited knowledge, they only become more vulnerable.

Amid such hopelessness, we are grateful for those who have committed to taking action. Those champions try to solve problems through real action to protect rivers, for instance by sharing information about the environment and rivers, and encouraging residents to engage and join river communities in their respective areas, or by scaling up the river community organisation. These champions are the drivers of community involvement and members of GRSI, a platform for many river communities whose membership has grown steadily over the past decade. The members are spread across Java, Bali, Nusa Tenggara, Sumatra, Kalimantan, Sulawesi, Maluku and Papua.

The champions in this book—I Gusti Rai Ari Temaja of Tukad Bindu (Bali), Kaharuddin Muji of Sungai Jeneberang (South Sulawesi), Usman Firdaus of Ciliwung River (Jakarta), Syamhudi and Vivi Norvika of Kapuas River (West Kalimantan), Robah of Bengawan Solo River’s downstream in East Java, and other champions are examples of change makers who have worked to organise and mobilise river communities.

They spoke up, shouted, encouraged, initiated, gave examples, and supervised the growth of the river community patiently and never giving up. They move with the determination that everyone has the right to fight for and protect rivers in their neighbourhood and other areas. Therefore, they continue to invite everyone, including those who haven’t yet exposed and reached.

The method adopted by the river community is actually a movement method based on a transdisciplinary concept that combines various fields of knowledge, both explicit knowledge (formal knowledge) and tacit knowledge (knowledge from experience). Social sciences, economics, engineering, environment, law, education, culture, psychology, government and so on are blended and integrated by the river community to produce a transdisciplinary science of river restoration. This highlights implementation of their concrete actions and helps these communities to continue to spread throughout Indonesia.



Three decades of movement

GSRI’s milestones can be recognised across 3 decades: pre-2000, 2000–2013, and 2013–present; a long-term process to restore polluted and neglected rivers in Indonesia.

In the first decade, pre-2000, a number of community groups had single-handedly tried to solve the problem of rubbish in their rivers. This effort often fails because there is no public awareness of anti-littering or anti-dumping behaviour. Piles of rubbish on the riverbank can be found almost every 500 metres along the river channel, and the general public does not pay any attention to rivers. The government at that time was also still focused on river development by building embankments, weirs, dams, cliff protectors (retainer walls) and flood control channels in stone and concrete along the river. The approach used is still merely ‘river engineering’, and has not reached the level of

ecohydraulic integrality. Rivers are still understood as simple waterways and places for dumping waste and rubbish.

The river was understood as a landfill to be managed and optimised. The ecohydraulic approach, which combines fluid engineering and ecology, was at this point unknown. River straightening was a common engineering practice in Indonesia—take for example the straightening and drainage pipeline of Bengawan Solo in 1995–2000 and the straightening of Citarum River in 2000–2003. When rivers were ‘normalised’ it was to ensure a straight riverside, clear of vegetation and, if needed, with cliff supports of stone, concrete and sheet piles. At this point, there was little direct participation by the people in river projects.

During the next decade, 2000 to 2013 or the post-reformation era, river community forums began to emerge in some regions. The community’s first efforts to reacquaint itself with the river came in the form of social organisation and river clean-up as a community service. During this time, there were 2 models of river community: the first built from an individual or community’s awareness of the river’s condition, and the second supported by universities, NGOs or government. Both varieties of river community have continued to grow.

In its next decade—2013 to present day—the river community was characterised by the use of social media. The participants of the river border study group initiated by *Balai Besar Wilayah Sungai* (River Basin Organization, BBWS) Serayu Opak, conducted in Central Java at the end of 2013, agreed at the end of its project to create a WhatsApp group where they could continue communicating each other. From that point, other WhatsApp groups began to crop up around Indonesia, communicating their activities and sharing their knowledge and experience with one another.

Resilience and sustenance

The River Community consists of local communities, academics, bureaucracy, members of the press, cultural figures and others. This community exists to raise voices towards solving river problems, therefore the approach applied is a comprehensive and transdisciplinary approach that accommodates all elements including biotic, abiotic, cultural or ecological, and inanimate objects (ecology and their habitat), as well as culture (technology, social, economic).

By accounting for the importance of the river to the communities that live on its banks, river restoration projects will also plant the seeds of resilience in the hearts of the people—they will learn to trust their initiative to learn about the river ecosystem for themselves and develop a sense of responsibility to face down problems ranging from habitat damage to flash flooding.

The River Care Community is focused on development for the complex ecological, social and economic dimensions of resilience over simple risk management. Resilience is not static but grows over time and derives its strength from its multidimensionality. A paradigm shift from risk management to resilience-based development will ensure a sustainable response to the effects of natural disasters.

Community’s resilience: Economical, ecological, and the socio-culture aspects

In its early days, the river community movement focused entirely on ecological factors such as water quality, river border revitalisation and vegetation protection. These were the most challenging issues, but merely addressing those issues will not provide a complete solution to the problems faced by the community.

As an increasing number of communities struggle under economic pressure, the river communities' movement has increasingly considered the possibilities of an environmentally friendly river tourism program, offering modest attractions such as tubing, traditional food, fishing, fish watching, boat rides, arts and crafts and so on. The success of river tourism has even led to some communities attracting support from central and local governments and industry, leading to further growth and job creation.

Meetings between river community groups have been integral to growing the movement's understanding of the river as an ecosystem, which has helped them to keep river tourism environmentally friendly. The tourism program does not build in concrete on the river, does not move or modify river channels, does not cut down riverside vegetation and understands that the rivers are a natural system to be maintained and enjoyed.

The benefits of a healthy river ecosystem go far beyond the economic. Although it may initially have been the success of river tourism that encouraged people to discover the importance of environmental protection, there are far greater *downstream* benefits. As the river's ecological and hydrological functions are protected, the river can better protect from the effects of flash flooding. River borders planted with vegetation will reduce flash flooding and prevent erosion, which means that life and property are protected alongside the wildlife that sustains farming.

Expanding learning practice

From its inception, the river community movement was designed to reach every part of Indonesia. From a single WhatsApp group started by GRSI National, the movement grew into multiple regional chapters to accommodate and connect river activists or champions across Indonesia, and now comprises 78 GRSI WhatsApp groups, reflecting an even greater number of real-world river communities.

Through the River School system, the river community is able to spread its knowledge freely to the community, empowering individuals to take local action to preserve the river, using tested and researched approaches that can be shared freely. Written and video-based learning materials are shared among all members of river communities and equip them with the basic knowledge they need to protect their river and keep their settlement safe.

The river restoration movement has created a new model for river restoration, the first in Indonesia and perhaps the first in the world, and everyone involved deserves our congratulations.

Prologue

Disaster Literacy from the River School Movement

Lilik Kurniawan, S.T., M.Si

Deputy of Logistic and Equipment Division of National Disaster Management Agency



The size and complexity of Indonesia's river systems make them especially vulnerable to the effects of hydrometeorological disaster, specifically flooding. Damage to river systems exacerbates the problem as mining activity and loss of shoreline vegetation raise water levels and increase the likelihood of flash flooding in populated areas.

The National Disaster Management Agency (BNPB) in 2015 launched an ecosystem-based movement to reduce disaster risk. A comprehensive approach to protecting the river systems of the River Basin Area (DAS) entailed the establishment by BNPB of a mountain school, river school and sea school, drawing on expert knowledge to inform communities of best-practice approaches to protecting the river ecosystem and reducing the damage caused by natural disaster. Each of the 3 schools has its own core movement: the mountain school supports environmental preservation in the upstream area, the river school focuses on the river basin, and the sea school protects the sea from garbage flowing from the river.

At least 108 locations in the River Basin Area are in a critical condition due to the effects of garbage dumping and river function degradation. The river school's role is to share knowledge on how local communities can work to restore the DAS to a condition where it can hold its banks during heavy rains and protect towns and villages from flash flooding.

The idea of involving the community in river basin restoration has received support both from the Ministry of Environment and Forestry (KLHK) and the Ministry of Public Works and Housing (PUPR), 2 government ministries that hold authority over environmental and river management. This idea is aligned with an overall paradigm shift in river management from treating the river as an inanimate object to treating it as a living entity.

The river school is not a physical classroom, but a platform that is open to anybody who is willing to learn and act to protect the river. Its 'teachers' are those who have sought to protect the river and practical knowledge and experience that they wish to share with others, and its goals are to first raise awareness, second take action, and third to secure the river as a source of livelihood.

During this first step, the river community received information regarding river conservation and the importance of preserving the healthy river ecosystem. Beside reducing the likelihood of flooding, a clean river ensures ready availability of potable water and will reduce rates of illness in children. Communities are finding their own ways of policing river pollution, some through awareness-raising campaigns, or by constructing monitor towers to catch illegal dumping.

Growing awareness leads to direct action. In this second step, the river community takes action to preserve the function of the river independently, without financial support from government. This action might take for example the form of river clean-up activities or improved waste management policy, but entails a systemic, institutionalised community movement requiring oversight by an organisational body. While around 50 river communities had reached this step by the end of 2018, the number is now around 500 and continues to grow.

The third step is to make the river a part of people's livelihood. This has been achieved in several river communities, taking a form dependent on the culture of its location. For example, one region has found that transforming the river into a tourist destination ties the continued economic success of the community directly to the maintenance and conservation of a healthy river system, meaning it will remain in the community's long-term interests to protect the river it lives on. This final step in particular nurtures a sense of belonging and symbiosis for river communities and is the most important for protecting the river basin into the future.

Another route to spreading a spirit of collective action in river protection is through the involvement of women. As women become active in conservation, their families are likely to follow suit. In several regions, women-led movements such as Srikandi Sungai are beginning to emerge, ensuring that DAS preservation does not become a men's movement and will reflect the needs of all members of the community.

At this point, the river school has taken action into the grass roots in nearly every province of Indonesia and will continue to grow as a platform for grassroots knowledge sharing on disaster mitigation. For BNPB, the community's involvement is a crucial part of the disaster-risk-reduction strategy, alongside the active involvement of central and regional government, the private sector, academia and media, each having its own role to play in river restoration.

For their role in popularising and growing this work, we warmly welcome SIAP SIAGA's efforts to document the struggles of agents of change in Indonesia's river communities. The stories in this book present a valuable lesson in supporting the emergence of a new disaster literacy movement, and we hope its readers will be struck by the importance of preserving our rivers and by how readily this goal can be achieved.



An Anthology of Inspirational Stories of River Community Resilience



“We Protect Nature, Nature Protects Us”

The traffic and noise amid the scorching April weather faded little by little and as we entered Tukad Bindu of Southern Denpasar Subdistrict, Denpasar, Bali. Absorbed by the giant green trees growing along the river border, the heat lifts and with it our fatigue. As we arrive at Manik mas Village Temple, Banjar Ujung, Kesiman, Southern Denpasar, we are met with a serene atmosphere of chirping birds and the splashing of water. The air is fresh.



Apart from being cleaned regularly, Tukad Bindu is equipped with facilities such as decorative bridges and location markers, makes it a convenient place for the community.

It is no surprise that on such a hot day, Tukad Bindu would attract visitors. Several middle-aged people are strolling by the river border, perhaps exercising, and dozens of youngsters are sitting around playing mobile games. Tukad Bindu has become an oasis in the increasingly crowded Denpasar, but it was not always such an attractive place. The *tukad*—Balinese for ‘river’—was for a long time described as *serem* (spooky) and *resem* (dirty). It took the love of several citizens for their natural environment, and more than 10 years of labour, to transform Tukad Bindu into such a beautiful spot. Tukad Bindu is spread across 2 administrative regions: the southern part of the river border is located in the Kesiman Petilan Village, while the western part is in the Kesiman Urban Village of South Denpasar Subdistrict. The river passes through 4 *banjar* (roughly equivalent to a neighborhood block¹) named Banjar Tunjung, Banjar Dukuh, Banjar Abian Nangka Kaja and Banjar Abian Nangka Kelod. From its upstream in Kesiman Urban Village, the approximately 6-metre-wide river flows on to several other villages, including Renon and Sanur.

Tukad Bindu is in fact a *subak* channel, part of a Balinese traditional irrigation system built in the colonial era. The channel carries water from Oongan Dam—originating in Tukad Ayung, one of the largest rivers in Bali—downstream to where it can be used to irrigate fields.

The river’s central location in Bali’s capital is a challenge of its own. The Balinese custom of treating the back yard as *teba*, ‘a place to throw rubbish’, means that until the 2010 clean-up began, Tukad Bindu was filled with discarded plastics, animal remains and unused building materials.

The restoration project was born of the initiative of several citizens, including I Gusti Rai Ari Temaja, Ida Bagus Suryadharma and Ida Bagus Ketut Suantara. Together, the 3 felt ashamed to see Tukad

¹ Rukun Warga (RW)

Bindu in such poor condition and accepted an invitation from the Denpasar Government to follow the *Program Kali Bersih* or '*Prokasih*'—the Clean River Program.

Changing perception

According to I Gusti Rai Ari Temaja, known locally as Gung Nik, the first step in transforming Tukad Bindu was to change the perceptions of the locals and instil a desire to transform this *teba* (dump) into the region's front garden. 'We wanted to invite locals to realise the potential of Tukad Bindu and uplift it from being such an eerie and dirty place', he explained.



Gung Nik, the initiator and driving force of the Tukad Bindu Foundation, poses with the Tukad Bindu background.

Monthly programs were run at the *banjar* level to spread knowledge of the importance of the river. Local leaders called *Prajuru* instructed people to apply the Hindu principle of *Tri Hita Karana*, meaning to live in harmony with others, the environment and the Creator.

After 3 years, they formed the Tukad Bindu community in order to involve others in restoring and normalising the river. It is vital to spread an understanding that a well-managed river will mean a healthy local economy. Tukad Bindu has become a fishing spot, and a healthy river can support local markets and allows people to open stalls and other businesses which empower fundraising and keep money in the community.

According to Gung Nik, rubbish was one of the main problems facing the river. Aside from being an eyesore and a terrible health hazard, in sufficient quantities, floating garbage could impede or block the river and lead to flooding. The process to clean the rubbish was simple but took time. Nets were installed at various points along the river and periodically cleared. As knowledge of the method spread, more and more nets were installed and eventually the river was rubbish free.

With the acute problems addressed, the Tukad Bindu Foundation was formed in 2017 to continue to manage the Tukad Bindu area. The program has since expanded beyond environmental clean-up to also include the social, cultural and education aspects of river health. One of the foundation's early programs, peculiarly nicknamed *Gila Selingkuh* (lit. Crazy for Affairs)² was built on the 5K principles, namely *kemauan* (determination), *kemampuan* (capacity), *keberanian* (courage), *komitmen* (commitment) and *keberhasilan* (completion). Initial capital of IDR200 million was secured from the Village Credit Institution (Lembaga Perkreditan Desa or LPD) and local workers offered their labour for duties such as brush clearing, clearing around protected trees, building pedestrian walkways and constructing benches and gazebos for rest.

A year later, the foundation arranged a 're-opening' of Tukad Bindu, and began to raise funds to repay their debt. 'We arranged drawing and fishing competitions and managed to repay the money within a year', said Gung Nik. Through their efforts, Tukad Bindu has been transformed from a frightening, dirty place to somewhere people can relax, enjoy nature and spend time with their families.

² The full name is *Giat Lestarian Alam Selamatkan Lingkungan Hidup* (Actively Preserving Nature Saves the Environment).

Becoming an inspiration

After 13 years, Tukad Bindu has undergone a drastic transformation. The foundation has built additional amenities such as the educational Jati Park on the river's south, with play areas, food stalls and even a co-working space.



Jro Puspita delivers “canang” during prayer at the Tukad Bindu border in April 2023.

Jro Puspita Wikrama is one of the local people who has witnessed the Tukad Bindu's transformation. Puspita and her family live in the western section of the river. Puspita, a stay-at-home mother of 3, said that 'People used to be afraid to go near the river, it was dirty and kind of ominous, but now even children love to play there'. On that April afternoon, Puspita was serving *canang* (offering) by the riverside. That's her everyday routine as a Hindu in preserving the river, inspired by the principles of Tri Hita Karana. Beyond her spiritual duty to preserving the river, Puspita has also ceased to wash and to dump rubbish in the river. 'I'm happy to say I don't wash my clothes or dishes in the river anymore, now that I know how much that can hurt the river's ecosystem', she said. But

the restoration of Tukad Bindu was not done by the people alone. The project would not have been as successful without the support of the Denpasar Government. Gung Nik listed other institutions that had offered their support, including the Environmental Agency (Dinas Lingkungan Hidup), Local Government Owned Water Utilities (Perusahaan Daerah Air Minum) and the Public Works and Housing Agency.

Head of Kesiman Urban Village I Nyoman Nuada's team also supported the normalisation of Tukad Bindu. An amount of IDR1.5 million per month was arranged for daily prayer funds, and the Kesiman Urban Village formed a new Sanitation Subdivision (Satgas Kebersihan) to oversee the river's daily condition. Nuada explains that unlike a village government, urban village are unable to create a Village Owned Enterprise (Bada Usaha Milik Desa or BUMDes) and cannot wield direct authority over Tukad Bindu's ongoing management. In place of direct control, the urban village government supports the grassroots work of its citizens in other ways, such as by spreading the successes of Tukad Bindu to other regions under its purview. Nuada described plans to normalise other rivers in the area, including a river 4 *banjar* downstream. 'Other rivers are not yet bordered, and their water flow tends to be shallow', he said.

Gung Nik was proud to see his work along Tukad Bindu become an inspiration for other river communities, even at the national scale. Tukad Bindu has become a learning centre for communities who hope to preserve their own rivers. There are currently 40 river communities in Bali applying the Tukad Bindu method, including for example Tukad Ulu Petanu, Gianyar and Bakti Ring Pertiwi in Penebel, Tabanan. 'We are proud to see that what we have achieved is being used to inspire and educate'.

At the national level, Gung Nik has shared Tukad Bindu's achievement in Java, Kalimantan and Sulawesi islands. The Tukad Bindu initiative placed in the top 5 of the River Care Communities Competition, convened in 2017 by the Public Works and Housing Ministry. They also received attention from the international community, including a visit from the World Bank in 2017.

Infographics of the Condition of Tukad Bindu, Denpasar City, Bali



Problems faced by locals around Tukad Bindu, Denpasar, Bali:

- ① Tukad Bindu is dirty and spooky, regarded by some as haunted.
- ② Locals were indifferent to the condition of the river and would use it as a garbage dump.



Effects of the existing problems:

- ① The river ecosystem was in terrible condition.
- ② The pile-up of rubbish risked impeding river flow and causing floods..

Local solutions included:

01 Starting a movement to clean and normalise Tukad Bindu by utilising the Clean River Program (Prokasih) to change locals' perception of the river.

02 Involving *banjar* leaders in a push to inform locals of how to appropriately dispose of rubbish without using the river.

03 Creating the Tukad Bindu Community in 2013 to manage Tukad Bindu, later formalised in 2017 into the Tukad Bindu Foundation, which manages the area through environmental, social, cultural and educational programs.



04 Collaborating with government and private sector entities to improve and preserve Tukad Bindu.

05 Assisting other river communities who aspire to similar success with their own rivers.

Shoulder to Shoulder in Protecting Jeneberang River

Ahead of the end of Ramadan fasting in mid-April 2023, there is heavy traffic on Jeneberang River's Twin Bridges, Gowa Regency, South Sulawesi Province. But the river below is just as congested with the movement of boats—ferries carrying passengers and their motorcycles from Makassar City to Bontoala Village, Pallangga Subdistrict, Gowa Regency and back again. This mode of transport is preferred by many locals as the boat's route can drop them much closer to their homes, but despite the practicality, crowding is very much limited to the dry season. Once the rain grows heavy, most locals do not dare to use a boat crossing. This knowledge is part of Jeneberang's character.

The 90-kilometre-long river, originating in Mount Bawakaraeng in Gowa Regency, with its downstream in Makassar City, can overflow due to high rainfall—as happened in 2019. At that time, unusually high rainfall raised water levels at the Bili-Bili Dam in Bili-Bili Village, Bontomarannu Subdistrict, Gowa Regency. Water levels in the dam are divided into 5 classifications: below normal (-99.50m), normal (+99.50m), alert (+100m), caution (+101.60m) and warning (+103m). Rains that year brought water to a caution-rated level of 101.9m. The increased power of the river's current at caution levels was sufficient to wash away one of the bridges upstream on Jeneberang River, in Moncongloe Village of Manuju Subdistrict.



Jeneberang River.

At present, the general condition of *Daerah Aliran Sungai* or River Basin Area (DAS) of Jeneberang River is considered critical. The Bili-Bili Dam, built in 1992 to accommodate sedimentation in the river and control flooding in Makassar City and Gowa Regency, was expected to accommodate sedimentation for 50 years, but is already beginning to shallow. What is happening on Jeneberang River is a stark contrast to the way things were even as recently as 2004. Kaharuddin Muji who has lived near the river since his childhood, in Parigi Village of Tinggimoncong Subdistrict, Gowa Regency, recalls that its surroundings were once quite beautiful and its water was clear, safe to drink even without boiling.

The river's clear water turned brown after the eruption of Mount Bawakaraeng in 2004. The fracture of the eruption caused landslides on a massive scale, washing an estimated 300 million cubic metres

of soil and rock into the river. The overflowing water caused flash flooding that claimed 33 lives, killed hundreds of livestock and damaged settlements and infrastructure near the river. Jeneberang has not yet recovered.

Sabo Jeneberang community

The flash flooding which devastated areas in the upper stream of Jeneberang River in 2004 marked an immediate change in locals' relationship with the river. In 2005, Kaharuddin Muji and his friends formed the River Community, with a mission of preventing similar incidents from claiming more lives in future. Kaharuddin Muji, or Daeng Muji, said that the worst was felt by locals in the upstream area—Parigi Subdistrict, especially in Manimbahoi Village, and in Tinggimoncong Subdistrict, especially in Bontolerung Village. People were understandably traumatized by the incident and feared subsequent flooding.



Kaharuddin Muji (Daeng Muji).

With other affected locals, Daeng Muji formed the Sabo Jeneberang Community network, with 800 *kepala keluarga* or heads of family (KK) as members. The initiative was carried out through an NGO called *Wahana Kesehatan dan Lingkungan Lestari* (Healthy and Sustainable Environment Foundation or WaKIL) headed by Daeng Muji.

Members of Sabo Jeneberang Community come from 7 villages in the 2 affected sub-districts. The community's first act was to implement community-based disaster early warning systems, using traditional tools such as 'kentongan' (traditional communication tool made of wood or bamboo) to raise the alarm in the event of an impending natural disaster and signal to people to immediately move to a safe location.

During the 2006–2009 period, the community network ran frequent disaster drills, testing responses to the early warning system. Locals were also trained to navigate evacuation routes efficiently in the event of a disaster, decide who should be prioritised in emergency situations and decide what to prepare and how to reduce the risk of natural disaster. Locals also took direct action to protect the land and community by planting trees in landslide-prone areas as well as putting up warning boards and marking evacuation routes with clearly visible yellow flags.

This initiative seems to have inspired locals in other areas, as river community organisations have begun to appear in South Sulawesi (Sulsel), spreading from Gowa Regency into other regencies. In 2016, 10 communities gathered to form the South Sulawesi River Canal Community, and in 2019 they changed its name into *Forum Komunitas Peduli Sumber Daya Air Provinsi Sulsel* or South Sulawesi Water Resources Community Forum. Today the organisation has grown to over 200 communities.

Through the river community network, more and more people throughout the South Sulawesi Province are able to access information about disaster risk reduction.

River school

The activity in communicating disaster preparedness information to local communities gave rise to the idea of organising a formal training process. In 2016, the River Community formed a river school

in a central location near Jeneberang River, with the aim of providing education on the importance of protecting rivers for the benefit of the river ecosystem and the people who live on it. 'We are also collaborating with the Regency Government (Gowa) and the River Region Center', Daeng Muji explained.

Daeng Muji admits that the community has faced many challenges in managing the river school, such as finding volunteer teachers, but it has not dampened his enthusiasm and the river school continues to this day.

The creation of the river school was warmly welcomed by locals living along Jeneberang River and elsewhere. Its students were from varied backgrounds, from elementary school to university, to members of the community, both men and women. Daeng Muji can see day by day that locals' understanding of disaster risk is improving, which can be seen most of all in their passion for protecting the river. They understand that a healthy river is a source of life, but a damaged river can mean disaster.

Putri Ratu Rasyid, head of Jeneberang River School, says that the health of the river was not really taken into account before the river community was formed. It was not uncommon to see rubbish being dumped in the river. 'With the ongoing education, locals are now preserving and managing the river, even utilising the riverside land to grow vegetables and increase their income', she said. Healthy use of the riverside area is one of the lessons offered by the Jeneberang River School. Locals are invited to look at the economic opportunities the river can offer them as they protect it.

However, Putri emphasises that there are more challenges to overcome. At present, several families who live near the river and are vulnerable to the effects of flooding are reluctant to be relocated to a safer location.



River School activity on the banks of Jeneberang River.

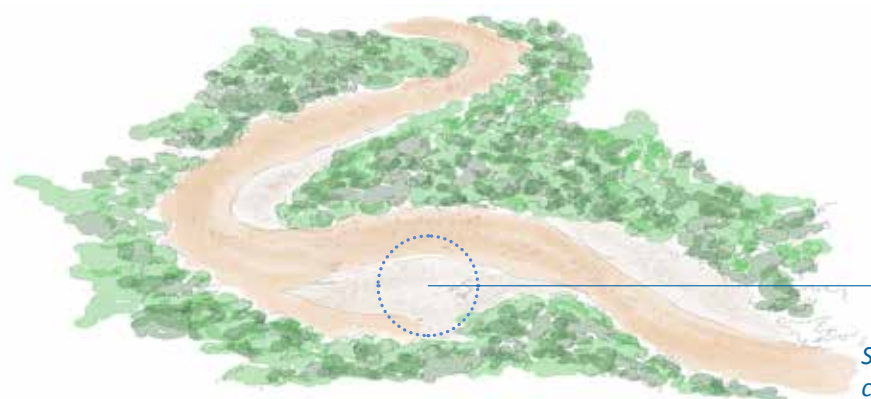
Spreading the spirit in the face of current challenges

The existence of the river community has so far been very beneficial for locals, according to Ramli Daeng Lallo, head of Mapala Environment in Bangkabinang Village, Pallangga Subdistrict of Gowa Regency. Despite this positive impact, Ramli explains that there are local residents who are still do not know anything about the river community's activities in the Jeneberang watershed. Therefore, they do not do anything to make changes in the way they live near the river, although there are many potential economic benefits for the residents who live along the Jeneberang River, 'There are many positive activities that can be done', Ramli says. He hopes there will be some assistance from government to support locals in carrying out activities in the river to improve the local economy. In the meantime, local residents can start their small economic activities independently while improving their capacity to manage the disaster risk of the river.

Ramli has recently opened a culinary tourism business on the banks of Jeneberang River and has encouraged others to take part in activities on the river. Aside from generating income, they can also preserve the river and protect the residents. To be able to do that, understanding the signs of natural disaster of the river is a must. 'Don't be afraid or doubtful as when signs of disaster appear, we shall predict it beforehand. Particularly when the rainfall is quite high in highlands, locals in downstream areas shall automatically alert', Ramli explained.

Through a network of communities and river schools, the lessons of the 2004 eruption and flash flooding will not be forgotten. Daeng Muji believes that increasing the resilience of locals is not negotiable. As the Bili-Bili Dam continues to experience shallowing and may soon become unable to accommodate further sedimentation, Daeng Muji's message is more important than ever.

Aside from natural factors, one of the main causes of the high volume of sedimentation entering Jeneberang River is Type C permit (small scale) excavation mining along the Jeneberang watershed. The regulation of mining activities is of course outside the remit of the riverside community, but they nevertheless continue to try and encourage policy makers to issue regulations that protect the Jeneberang watershed. 'The Type C mine in Jeneberang is one of the most important issues we currently face. The authorities need firmness and courage to take action against illegal mines, and concrete action from the government is required in stopping Type C mining operations', Daeng Muji said.



Sediment deposits in the rivers can reduce the depth of the water and make it shallow.

One of the functions of the South Sulawesi Water Resources Community Forum is to jointly push for appropriate policies, including to review the regulations that do not support the preservation of the Jeneberang watershed. Shoulder to shoulder through a community forum, local communities can anticipate and mitigate the activity that might increase the risk of the disaster that threatens their community.

Infographics on the Condition of the Jeneberang River, Gowa Regency, South Sulawesi

Problems faced by people living at the banks of Jeneberang River, Gowa Regency, South Sulawesi:

- 1 Following the eruption of Mount Bawakaraeng in 2004, an estimated 300 million cubic metres of soil and rock filled the river, causing flooding. The river has not yet recovered.
- 2 Excessive sedimentation is entering the river system as a result of Type C mining activity in the Jeneberang watershed.
- 3 Community preparedness for the risk of the disaster is not evenly distributed.



The impact of existing problems:

- 1 The river is filled with sediment and is now more prone to overflowing, especially during the rainy season.
- 2 Uneven standards of disaster preparedness may increase vulnerability as there is still a high risk of flooding.

Locals' efforts to approach these problems:

- 01 Forming the Sabo Jeneberang Community, with the aim of increasing disaster preparedness through education, simulation and conservation.
- 02 Developing similar river communities in other areas to form a network of river communities that bolster the South Sulawesi Water Resources Community Forum. The forum currently has as many as 200 members.
- 03 Initiating a river school to educate locals on disaster risk reduction methods, especially those particular to the Jeneberang River.
- 04 Encouraging a review of the relevant regulations from a disaster risk reduction perspective.



Collaborative Community Movements for Kapuas River Restoration

At 1,143 kilometers, Kapuas River in West Kalimantan Province is the longest river in Indonesia, and a source of life for all who live on it. Aside from being a vital transportation route, the locals use its waters every day to wash, bathe and cook. Therefore, when environmental crisis threatened the Kapuas River Basin, several communities took action to save the river.

Kapuas' upstream is located in the Muller mountainous area of Kapuas Hulu Regency, West Kalimantan, and it flows to the downstream area in the Karimata Strait (the South China Sea). It is a habitat to more than 700 species of fish, including a number of endangered varieties such as Semah (*Tor spp.*), Seladang or Patin (*Pangasius macronema*), Botia (*Chromobotia macracanthus*), Julung-julung (*Hemiramphidae*), Arowana (*Scleropages formosus*), Belida (*Chitala*), Tapah (*Wallago*) and many others.



Chair of Sangsakha-Vivi Norvika.

Vivi Norvika, a resident of Pontianak City in West Kalimantan and chair of the Joint Secretariat of *Sanggar Cinta Tanah Air Khatulistiwa* (Sangsakha) believes that the main issue of the Kapuas River in Pontianak City is water pollution caused by the activity of industry and locals, who throw their waste and rubbish directly into the river. Additionally, mercury dumping from illegal mining and gold refining activities is causing ongoing damage to the river ecosystem.

In the Pontianak City area alone, several locations along the river are polluted. According to monitoring by the Pontianak Environment Agency at the end of 2022, of 27 sample spots along tributaries of Kapuas River such as Kapuas Kecil, Kapuas Besar and Landak, the quality of the water in 18 spots is good, but 14 spots have light pollution, and one spot shows moderate pollution. The condition of the river has not improved in the last 10 years, and if the condition were left unchecked, it would affect the ecosystem of the river. People who depend on the Kapuas River will also suffer, either from disease caused by water pollution or indirectly through economic damage, in particular for fishermen. Flooding is also a concern, and in fact there was a major flood in 2023 in Kapuas Hulu and Bengkayang Regencies. Vivi says the pollution along Kapuas River has grown serious enough that over the past 7 years, the community in Pontianak City have started their own independent efforts to clean the river.

With many Kapuas-care communities springing up around Pontianak City, there is a need to connect these communities with one another. In 2016, the Kalimantan River Region I Office used National Waste Awareness Day to invite communities with the same mission in protecting Kapuas River. Around 1,000 volunteers gathered and shared their stories and ideas to protect the river.

In 2018, one of these river communities called *Komunitas Sungai Putat* (KSP) or Sungai Putat Community received—alongside 6 river communities from other regions across Indonesia—the River Community Award from the Ministry of Public Works and Housing. According to Syamhudi, a representative of KSP, the ministry encouraged winners to form a joint secretariat in their respective regions. Syamhudi took this advice and in 2019 he re-gathered volunteers from the National Waste Awareness Day event to form a joint secretariat, which was named *Sanggar Cinta Tanah Air Khatulistiwa* (community for the love of equatorial homeland) or *Sangsakha*.



Students of Tudong River School are planting Mangkuang trees on the banks of Kapuas River. Tudong River School is formed and managed by Tudong Village Waste Bank and Sangsakha Community.

Sangsakha Joint Secretariat consisted of 23 communities, who agreed to work together to educate the public on environmental issues through activities like cleaning the river, planting trees, creating waste banks and training on disaster risk reduction topics. During the Kapuas floods, Sangsakha collaborated with government and other parties to manage the response. 'The communities involved are not just focused on environmental issues. The River Basin Area can affect people's lives in many different ways', Syamhudi said.

Vivi Norvika was elected as the chair of the Sangsakha in 2021, replacing Syamhudi, and continues the mission of restoring Kapuas to its natural condition.

In an effective manner

In line with the goal of its founding, Sangsakha seeks to coordinate the Kapuas River Community movement in carrying out various activities to increase the resilience of the people living on the river. Sangsakha currently comprises a network of 40 communities, focused on activities ranging from education and restoration to river cleaning and rescue. Sangsakha also coordinates with other stakeholders in government as well as with youth, women and indigenous communities.

According to Vivi, Sangsakha is particularly focused on carrying out campaigns with schools in order to capture the enthusiasm and innovative spirit of Indonesia's youth, and to involve them directly in projects. There is also great benefit to teaching disaster literacy as early in life as possible, to provide a strong basis for resilience.

Sangsakha is also seeking to involve the Dayak indigenous community, both to benefit from and share in their traditional knowledge of how to be resilient and live in harmony with the river, since their community has been directly affected by damage to the Kapuas River Basin Area.

As a woman, Vivi is also trying to involve more women and women's organisations in the restoration project. Women play a primary role at the family level in teaching the importance of protecting the rivers, and so far have proven very easy to work with. One of the women's organisations is Rancak Alun Kapuas, which has around 30 members and is actively involved in cleaning and managing waste in the river.

Sangsakha routinely communicates with the Kalimantan I River Basin Center and the West Kalimantan Natural Resources Conservation Agency (BKSDA) in disaster prevention and management efforts, and collaborates with the National Search and Rescue Agency to train the community in flood rescue and resuscitation. In addition, Sangsakha has coordinated with 6 urban villages in Pontianak City to carry out a joint clean-up movement, following the footsteps of Kampung Gambut in Siantan Hilir Urban Village, North Pontianak Subdistrict, who have already passed village regulations on the prohibition of river dumping and the regulation of hunting and fishing activities. With their success at the local level, these regulations will be encouraged at the regency level. 'If the community and government can work together, our efforts to protect the Kapuas River will be far more effective', Vivi said.

As public awareness has improved, people living on the riverbanks are reminding one-another of how to protect the river, maintain water quality and prevent flooding. 'Before 2016, the community didn't really care about the condition of the river, but the public awareness campaign has had a very positive impact', Vivi added.

Waste bank in Tudong Village

Another approach in restoring Kapuas River is the establishment of waste banks. Diah Kartika Sari, leader of the Kampung Tudong Waste Bank in Gang Haji Ali, Imam Bonjol street, Pontianak City, explains that its purpose is to reduce river dumping by creating a place where people can safely dispose of their household garbage in exchange for a small financial incentive. The project was started in February 2022 and has successfully both reduced the river dumping and brought money into the community.

With initial capital of IDR500,000 Diah and her friends run the waste bank using a pick-up and drop-off system. They accept useful waste such as cardboard, cans and plastic bottles which they purchase



Diah Kartika Sari, Chair person of the Tudong Village Waste Bank.

at prices starting at IDR1,000 per kilogram, and then sell on to the garbage collectors. Diah and the waste bank's members continue to reach more residents, either by visiting their homes directly or taking advantage of community activities to spread their message. The efforts were initially scorned, but Diah remained determined and there are now 4 neighbourhood units collaborating with her group, each with its own Waste Bank branch. 'Every week, we just pick up trash from each of these branches. People who want to save and sell their waste can also contact us directly', she said.

In early 2023, the education and outreach had become so successful that Tudong Village Waste Bank and Sangsakha Community formed a River School. Currently, the school is focusing its efforts on the children living around Gang Haji Ali. 'Children can learn about river ecosystems, the plants and animals and other water life and how they all depend on each other', Diah explained.

Synergy between the government, entrepreneurs and community

At the World Environment Day commemoration event in Pontianak City on June 25, 2023, Mayor Edi Rusdi Kamtono announced that the Batu Layang Final Disposal Site (TPA) receives at least 400 tons of waste daily, of which 67% organic, originating from households, industry, schools and offices.

Every year, the government budgets IDR45 billion to overcome the waste problem, but even this amount is not sufficient in face of the scale of the existing problem. The government cannot act alone, and the involvement of community and private-sector actors is essential, including maximising the function of waste banks so that the volume of waste in the final disposal site is reduced. The key to cleaning Kapuas, suggests Vivi, is cooperation between community and government. Even if one local area successfully cleans its section of the river, garbage dumped upstream can wash down and undo all their hard work. Waste from mining activities is even more difficult to be cleaned up at a community level and it flows freely from one section of the river to the next. Issues like these require government level oversight in cooperation with community organisation, and Sangsakha will continue to encourage and build synergy at all levels to restore Kapuas River.



River cleaning activity on Kapuas River.

Infographics on the Condition of the Kapuas River, Pontianak City, West Kalimantan



Problems faced by locals in Pontianak city of West Borneo:

- 1 Kapuas River is polluted by garbage and waste dumped by locals, industry and mining.
- 2 The increased dumping is shallowing the river, making flooding more likely.



Effects of the existing problems:

- 1 Water pollution threatens river fauna, including numerous endangered species of fish. The reduced water quality also threatens locals' health (through the risk of e.g. skin diseases), economy (by reducing fish catch) and their property (through flooding).
- 2 Floods have already struck the outer regions of Pontianak, such as Kapuas Hulu and Bengkayang Regencies.

Local efforts to solve these problems:

- 01 Forming river care communities and cleaning the river directly.
- 02 Forming a joint secretariat to manage and coordinate the efforts of river care communities (the organisation is named *Sanggar Cinta Tanah Air Khatulistiwa* or Sangsakha).
- 03 Establishing synergy with government and private sector to restore Kapuas River.
- 04 Involving youth (undergraduate age), women (Rancak Alun Kapuas, Kampung Tudong Waste Bank Management etc.) and the Dayak indigenous communities to address the unique problems they face, and to make use of their unique skill sets.



Transforming Ciliwung into a Green Beauty

TCiliwung River, which stretches for almost 120 kilometres, should be a place of great green beauty. But for years any news of the river's condition has been bad news. Crossing Bogor Regency, Bogor and Depok cities of West Java Province and the capital city Jakarta, Ciliwung is known as a flood-prone and polluted river, a dumping ground for industrial and household waste. The people who live along the river have decided to take action to restore the river's beauty and grow their spirit of resilience and volunteerism.

On an early April afternoon in 2023, no fewer than 15 citizens gathered at the Ciliwung riverbanks in Cikoko, Pancoran, South Jakarta. All of them members of *Masyarakat Peduli Ciliwung* or Mat Peci—the Ciliwung Care Community. They spent the afternoon collecting the rubbish they found trapped in the river's sediment. The river cleaning was held during the month of Ramadan, so after cleaning they performed their ablutions and gathered at Mat Peci headquarters to converse as they waited for the breaking of their fast.

Sutrisno, a resident of Rawajati urban village of South Jakarta, says he joined Mat Peci in 2014 after receiving an invitation from a friend, but the river had been on his mind long before that. 'My house is on the riverbank. The rubbish just keeps piling up, and there are floods every year', he said.

Dodsky, who invited Sutrisno, said that Mat Peci's activities consist of regularly cleaning the river and cultivating crops on the Ciliwung riverbanks. During the rainy season, members of the community will stand guard and help with flood evacuations, and are trained for rescue if anybody is swept away by flood. The river has a strong current, so the work of Mat Peci is not without serious risk.

Even cleaning the river comes with its dangers; Sutrisno's hands and feet have been repeatedly injured by submerged broken glass and at one point even impaled on a submerged branch. He has remained a steadfast and determined volunteer, and says that he sees the preservation, protection and sustainability of the river as a personal responsibility.

Over 10 years working with the river, Sutrisno has seen people's habits change. 'People used to throw their rubbish into the river, but since Mat Peci was formed they haven't dared!' said the man who now works at DKI Jakarta Public Infrastructure & Facilities Management (PPSU).

Those affected by development

The upstream of Ciliwung is located in the highlands of Bogor and Cianjur regencies or, more precisely, at the spring of Gede Mountain, Pangrango Mountain and Saat Pond of West Java. After passing through Bogor, the river flows into the Jakarta–Bogor on the east of Depok before entering the Jakarta area. The Ciliwung catchment area is 387 square kilometres in size.

Residents of Jakarta who grew up around Ciliwung have a close bond with the river. Ibrahim, a resident of Balekambang Village, East Jakarta has fond memories of Ciliwung River. As a child he would often swim and play in the river, or go there to fish. 'When I was a kid, we used to think that if we ate shrimp, we'd become good swimmers. The shrimp used to be clean, not muddy like it is now', he recalled.

As towns developed, the beautiful and pristine river began to change. Based on 2017 research from the Indonesian Institute of Science (LIPI), only about 20 fish species remain of the 187 that originally

inhabited the river, a loss of 92.5% caused by human activity and industrial pollution. Changes in land use in the Puncak Bogor area have also had an effect on the river. Lowland flooding used to happen maybe once every 5 years, but now there are floods 2 to 3 times a year. Locals still consider flooding a natural disaster, but to Ibrahim the rapid increase is anything but natural. 'It was human behaviour that caused this, especially the careless development in the Puncak region', he said.

His concern for the state of the river led Ibrahim to join the Mat Peci community in 2015. Together with other residents he helped haul off rubbish that would normally pile metres high and slowly, what was starting to look like a landfill was transformed into a park, a playground, a community centre.

Ibrahim admits happily to the pride he feels seeing this once polluted and flood-prone river transformed into a children's playground. His dedicated work for Mat Peci has led to his appointment as PPSU DKI Jakarta staff. 'This was unpaid volunteer work at first, but now I have a job and an income'. But the work is not about a career, it is about a community of care. 'If we do not form a community, this would just an individual movement without significant impact. As a collective, the river community is stronger and word of its success will travel', he said.

Time is needed for convincing villagers



Usman Firdaus.

Usman Firdaus is the name behind the Mat Peci community. For over 17 years, he has sown the seeds that transformed indifference into organised action. Beginning from a clean-up project involving his wife and childhood friends, Usman managed to encourage others living along the Ciliwung river to care for the environment they live in. It was not an easy road. When Mat Peci was founded in 2006, Usman's mission was often met with hostility. He often heard: 'Who are you to stop us from throwing rubbish in the river? You think the river belongs to you?' He even received threats of violence, but he nevertheless continued to appeal to the public and seek their involvement.

In the early days he would invite his neighbours to help clean Ciliwung-Cikoko River. Once their work bore fruit, Usman sent a letter to the subdistrict and urban village heads, urging locals to help with the clean-up. 'Originally there were only a few of us. It took 3 years to convince others to join in', he said. People were encouraged to help remove garbage, but also to plant fruits and vegetables along the river, in the hope that a personal investment in the river would add incentive to keep it free of pollution.



Several members of the Mat Peci community enjoy the iftar menu together.

Maemunah, a local of Rawajati, South Jakarta and a mother of one joined Mat Peci after seeing a flood carry rubbish into her family's fishpond. 'When the rubbish people had dumped in the river was carried into our pond, I realised how dirty the river had become, and how bad it is to thoughtlessly throw our garbage in it', she said. Joining Mat Peci has meant that Maemunah could have a personal stake in the health of her neighbourhood.

Like Usman, Maemunah has faced indifference as she tried to educate others about the importance of the river environment, but it has not dampened her spirits. “My neighbors say ‘why clean the river – we have cleaning staff for that!’ Or they’ll say they’re too busy”. Maemunah soldiers on.

Involving various parties

Aside from continuously expanding the scope of his community, Usman cooperates with local government under the auspices of Mat Peci, because it is the government that holds the authority to formulate legal regulations. Encouraging the Provincial Government of DKI Jakarta to designate Ciliwung river volunteers as PPSU officers will ensure active contributors are recognised as state employees and receive an income..

Dadang Cahya Rusdiana, head of the Waste Management Unit of the DKI Jakarta Water Agency says waste management is a crucial problem for the Ciliwung River. To reduce waste, the Provincial Government of Jakarta is currently building a filter on the border of TB Simatupang. ‘The best way to reduce the amount of trash at Manggarai Water Gate is to intercept it before it gets there’, he explained..

Local communities also contribute to the work of Usman and Mat Peci. ‘We DKI Jakarta provincials cannot work alone. We need to coordinate with stakeholders along the river, including river care communities’, he said. Education and socialisation activities along the river have been highly successful. There are also collaborative clean-up events such as *Gerakan Ciliwung Bersih* (Clean Ciliwung Movement), held every year during Environment Day and Earth Day.



Several Mat Peci volunteers who are now working as the DKI Jakarta Public Infrastructure & Facilities Handling Officers are cleaning up rubbish in the Ciliwung River.

Mat Peci has collaborated with The National Disaster Management Agency (BNPB) in developing the Ciliwung river school and training volunteers in disaster management, and has also drawn assistance from the business sector, academics and the media to help in their campaigning.

The Mat Peci community has spread from the upstream area of Ciliwung River – Cisarua, Bogor and West Java – to people in coastal areas. The upstream to downstream network creates opportunities to make the work of Mat Peci more efficient, expanding and targeting river clean-up, and communicating early warnings in the event of lowland flooding. “When there is heavy rain upstream, we send out the information over WhatsApp and people in downstream areas have a chance to prepare”, said Usman.



The Ciliwung River in the Condut area, Kramat Jati District, East Jakarta looks clean and green after being cleaned regularly.

Thanks to the hard work of local volunteers, real change is beginning to happen. A number of creatures that have not been seen are beginning to reappear. ‘Dragonflies, shrimp and fish are starting to come back’. The improved condition of the river ecosystem means Mat Peci’s next step will be to commence eco-tourism, combining disaster education and river conservation with an opportunity for visitors to see and enjoy the now beautiful river. This will bring economic opportunities to villages along the river, and provide a chance for members of Mat Peci to share their knowledge. Usman hopes that someday the Ciliwung River will again be clean enough to drink from. The tireless work of the river community will no doubt soon make this hope a reality.

Infographics on the Condition of the Ciliwung River, DKI Jakarta



Problems faced by locals on Ciliwung River, DKI Jakarta:

- 1 The river is polluted, dirty and full of rubbish and household waste.
- 2 There is an increased frequency of lowland flooding.



Impact of the existing problems:

- 1 The river is in poor health. Various fish and shrimp species have disappeared, and it is dangerous to drink the water.
- 2 Lowland flooding disrupts daily life, damages property and can cause injury and loss of life.

Citizens' efforts to solve the problems:



01 Forming the Mat Peci community which focuses on implementing an early warning system for lowland flooding, cleaning rubbish from the rivers, preserving the environment around the river and education in waste and disaster management.

02 Generating the idea of ecotourism, which combines environmental conservation and waste management with disaster response education and the economic benefits of a tourism economy.

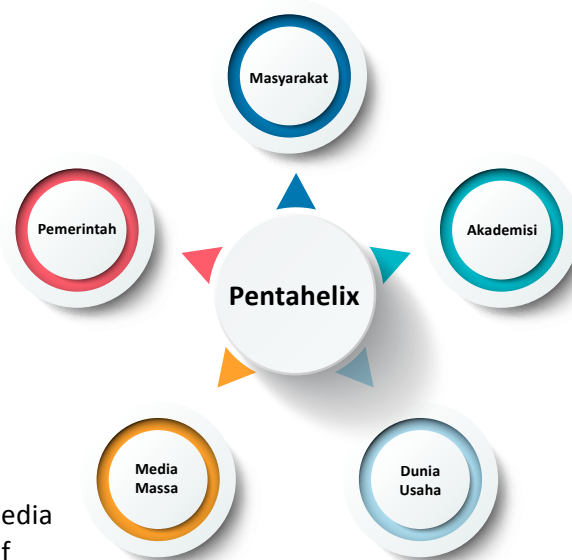
03 Collaborating with various parties to support the Ciliwung protection movement, including regional and central government, NGOs, the private sector, academics and mass media.

Ciliwung River waste management penta-helix:

Community: Mat Peci cleans rubbish from the river and recommends its members for employment with DKI Jakarta Public Infrastructure & Facilities Management (PPSU).

Governmental: DKI Jakarta Provincial Government aims to reduce the garbage load at the Manggarai Water Gate by constructing a waste filter at the TB Simatupang border.

Mass Media: Mat Peci collaborates with the media to spread information of community activities and to campaign for effective waste management.



Academic: Numerous universities have contacted Mat Peci for research collaboration along Ciliwung River, including Gadjah Mada University, Bandung Institute of Technology, Trisakti University and others. Student groups also frequently visit Mat Peci to assist in river care activities.

Business World: Mat Peci collaborates with the private sector in obtaining funding and facilities to carry out river cleaning and community empowerment work. Contacts include PLN *Peduli/PLN Care*, Unilever, Pertamina, Indonesia Power, *Danamon Peduli/Danamon Care* and more.



Living in Harmony with Bengawan Solo

Bengawan Solo, the largest and longest river on Java island stretches some 600 kilometres from Central Java to East Java Province. Volcanoes such as Merapi, Merbabu and Lawu deliver minerals to the river and its tributaries which make the land fertile, bringing the plants and then animals for hunting and farming. For thousands of years, people have lived along the river's banks, and Bengawan Solo has borne witness to how human civilisation can adapt and survive.

Dwi Cahyono, an archaeologist at the State University of Malang, wrote in his article 'Bengawan Solo Expedition' (Kompas 2009) that traces of ancient human civilisation have been found in the river's upstream area around Kali Muning and Kali Tenggar, on the border of Wonogiri Regency, Central Java and Pacitan Regency, East Java. In Punung Subdistrict of Pacitan there are karst caves thought to have been inhabited by early humans. Mesolithic axe-heads and mortars have been found in the downstream, and closer to Sragen, Karanganyar and Blora (Central Java) and Ngawi (East Java) regencies, archaeologists have unearthed fossils of Homo Erectus, Meganthropus Paleojavanicus and Pithecanthropus Erectus. Along the river to the downstream area, there is abundant evidence of Hindu–Buddhist empires from a different era.

The archaeological evidence indicates Bengawan Solo has been inhabited by civilisations from multiple eras, from hunter gatherer to early agrarian, bronze and iron age, into recorded history and to the colonial era and present day. Countless generations have been born, grown and died along the river.

Disaster Risk

While life on the river is a constant, settlement and civilisations come and go. Each generation faces its own challenges, but there is no universally accepted explanation for why certain riverside civilisations have died out. While living on a river does mean life and fertility, it can also bring the dangers of natural disaster.

Among the oldest records of natural disaster on Bengawan Solo is the Pucangan Inscription (1042CE) from the reign of Airlangga of Kahuripan Empire (present day East Java). The inscription mentions the existence of 'pralaya' due to an attack by King Wura Wari of Ngloram region (Anang Haris Himawan et al. 2021). 'Pralaya', which literary means apocalypse, is thought to describe a flash flood originating from Bengawan Solo. There are also records from 1863 of flooding in the river's upstream area (Kompas 2009)..

People today still rely on Begawan Solo's water for drinking, agriculture, transportation and more recently for industry. The water is used to supply rice fields, fish farming and domestic gardens, and boats use the river for travel, but beyond that supports sand mining and other small-scale industries. Just as the river affects the lives of the people who live on it, human activity in turn impacts the river. The Bengawan Solo River Basin Area (DAS) is currently in an environmental crisis caused by unregulated logging and deforestation, including logging of coastal mangrove alongside illegal mining and dumping of industrial waste. Flooding is part of living on a river, but these activities are making the floods more frequent and more dangerous.

Sadly, the river's reputation is becoming one of natural disaster and loss of life. In 2009, *Kompas* issued a stark reminder of the 1966 flash floods in Solo City of Central Java, Ngawi, Bojonegoro and Lamongan regencies of East Java, which claimed 168 victims and damaged some 182,000 homes as well as infrastructure and public buildings. The flooding also damaged hundreds of thousands of hectares of farmland across 93 subdistricts.



Flood Risk in Bengawan Solo.

The National Disaster Management Agency (BNPB) notes that in 2023 floods already affected Wonogiri Regency, Klaten Regency, Sukoharjo Regency, Surakarta City and Karanganyar Regency in Central Java. River pollution and shoreline deforestation are also linked to increased soil erosion and landslides.

Reciprocity

The people living around Bengawan Solo are not unaware of their dependence on the river, or that their actions affect the river's condition. As ever through human history, living with a risk of flooding has led local communities to adapt, finding ways to protect life, property and livelihood against natural disaster.

At a human level, building elevated houses, changing crop patterns and crop types all serve to protect people from the effects of flooding. Larger scale organised initiatives to address natural disasters at their source include tree planting, waste management, mangrove conservation and so on.

The final part of this book presents stories of how communities living at the banks of Bengawan Solo in Bojonegoro, Tuban, Lamongan and Gresik regencies of East Java are surviving and adapting to the river. The articles in this section show that despite their small scale, the efforts of locals have an impact on safety, the economy and the health of the river ecosystem.

An organised, cross-sector, cross-region and cross-government approach is essential to address the complex issues the Bengawan Solo river basin faces today, but such a movement must be based in the initiative and resilience of the people who live on the river; an understanding built up over thousands of years.

Bicycle Club Volunteering Spirit for Bengawan Solo

X23 Rescue is a youth community group built in the spirit of volunteering after the Bengawan Solo disaster. The group was formed in Banjarsari Village, Trucuk Subdistrict, Bojonegoro Regency of East Java to capture and direct the energy of young people away from listlessness and toward protecting their communities from the effects of natural disaster.

Banjarsari Village is located on the north of Bengawan Solo River, about 5 kilometres from the centre of Bojonegoro Regency. Being so close to the centre means it's easy for young people to find work while they continue to live in their village, so Banjarsari has a large youth community. Youth groups are common and generally just mean hanging out, chatting to pass the time or going for bike rides, but over time these casual get-togethers developed into more social and community-minded activities.



Langgeng Santoso (center) on a search and rescue mission in Bengawan Solo River.

One day purely by chance, a cycling group headed out of town, escorted by their friends in their cars. To look more like an organised group, one of the escorts raised a banner with the words 'X23 Cycling Club'. 'That was the origin of our name', said Langgeng Santoso, one of the founding members of X23 Rescue.

There is a colonial heritage bridge in Banjarsari named 'Kaliketek (*ketek*: monkey) Bridge', and Langgeng explained that the letter 'X' can mean *kali* (river), while the number 23 is a numerological code for monkey in Javanese dream interpretation. The name X23 is a stylish reference to a local landmark, demonstrating the energy and creativity of youth alongside a respect for home.

Focus on the disaster

Over frequent gatherings, the group began to develop a solid membership base and its goals began to grow. Without abandoning its usual social activities, in 2019 the group shifted its main focus to disaster response. Given the village's location on Bengawan Solo, the lowlands of Banjarsari are prone to yearly flooding or even damage from landslides, a huge burden to locals but a responsibility that X23 Rescue took on willingly.

The group began to map out the most high-risk parts of the village and plan where their contribution would have the greatest effect. 'The south, the lowlands right on the river are where the flooding will do the most damage. Our residence is in the north of the village, the highlands, so we're the ones who should act', said Langgeng.

Langgeng, already knowledgeable in search and rescue (SAR), accessed training held by National Search and Rescue Agency (Basarnas) and Subnational Disaster Management Agency (BPBD). Several other members of X23 Rescue have also begun to learn SAR skills and 3 have already earned their

SAR certification. Beyond training, the group has begun to independently purchase SAR equipment including life jackets, boots and headlamps.

When COVID-19 hit, X23 Rescue was at the forefront of preventive measures and new health protocols. When Mount Semeru erupted in 2021, they collected aid funding from Banjarsari Village to be handed directly to the victims of the disaster.



The X23 Rescue Team was involved as volunteers during the Covid-19 pandemic in their village.

Merging as Destana

In November 2021, the Disaster Resilient Village (Destana) program of the National Disaster Management Agency (BNPB) was applied in Banjarsari. Seeing the potential of X23 Rescue, they were asked to join the program.

Banjarsari Village Head Fatkhul Huda says the village government is fully aware of the various risks the village faces as a consequence of its location near Bengawan Solo. Aside from the risk of flooding, more than 100 heads of family (*kepala keluarga* or KK) are threatened by the risk of landslide. As the head of the village, Fatkhul has relocated 5 families and prepared 0.5 ha of land as a relocation area for others, currently awaiting confirmation from Bojonegoro Regency Government.

The presence of X23 Rescue means the village has a reliable team of young people to call on in the event of natural disaster. Fatkhul believes that an official forum such as Destana will be able to make X23 Rescue's work more organised and efficient, saying 'it is important for the progress of the village'.

Destana has subsumed X23 Rescue into Banjarsari Rescue and broadened their focus from emergency response to mitigation and planning; pre-disaster elements such as preparedness, which will increase community resilience. Rescue operations will continue, but as part of a broader approach.

This change has broadened the operating scope of X23 Rescue beyond the Kaliketek Bridge area and to youth throughout Banjarsari, and beyond Banjarsari to other nearby villages in need. In October 2021, members of Banjarsari Rescue's volunteer team joined the newly formed Elang Bengawan Rescue SAR volunteer team and then in March 2022 assisted them in a search for drowning victims near Banjarejo Village.



X23 Rescue Team Activity.

With broadened operating scope, indirect impacts are also felt. One of the villages in Banjarsari was turned into a restricted brothel complex or ‘lokalisasi’ (a term used to refer to a prostitution area). Even though it was officially closed in 2020 by Bojonegoro Regency Government, some perpetrators are still determined to offer prostitution services. Destana recruited several young people from the area and involved them in Destana activities. According to Fatkhul, this effort was considered successful as they became more confident and had the opportunity to join for more positive activities. It is hoped that this positive change can be transmitted as a cultural way of overcoming problems in the village.

These achievements also attracted women to become involved. According to Langgeng, there are currently several women in Destana Banjarsari, including one who has completed technical SAR training to take part in emergency rescue operations. Although its merger with Banjarsari Rescue through Destana could in some sense mean X23 Rescue no longer exists, its volunteer spirit can still be seen in the energy and will of Destana’s work. The group currently has 30 members, and the number is growing.

Building awareness

Broadening focus from emergency response to pre-disaster and post-disaster management is one of Banjarsari Rescue’s current organisational goals. While emergency response concerns the immediate protection of life and limb, Langgeng, appointed chief of Banjarsari Village Destana explains that ‘pre-disaster is about prevention for landslides or flooding; post-disaster is about the long-term psychosocial aspects.’

Prevention has commenced with a program of seeding hardy plants for planting on vulnerable riverbanks, with a nursery to be constructed on the former restricted brothel complex. The Banjarsari

Village Destana team has also started conducting campaigns in schools to teach how to safely prevent and respond to flood, landslide and fire.

To encourage emergency preparedness, disaster simulation activities and evacuation drills have been carried out in collaboration with BPBD Bojonegoro and the Bojonegoro Fire and Rescue Service. More senior members of Banjarsari Rescue are also using these training activities to periodically offer SAR technical training to their group, but if needed, members can access training programs from Basarnas and BPBD Bojonegoro directly. Langgeng stresses that while Destana is a national program, having a local team enables them to design programs that can cater to their own needs and circumstances.

The importance of local circumstance can be seen in the practice of river sand mining. According to Fatkhul, performing the mining in a deeper part of the river might indeed cause a landslide, but shallower portions affected by silt buildup can be mined without ill effect and can also serve to reduce the chance of flooding. But this is not something the village can do on its own. The assistance of the Bengawan Solo River Basin Organization and Bojonegoro Regency Government are both required to transform this local knowledge into effective mining regulations that can guarantee the security and safety of the citizens, but at the same time protect them.

Another example of the importance of local knowledge is the use of large rafts known as *tambangan*. Although they are risky, especially when the river currents are strong, many locals desperately need a means to cross the river quickly and cheaply in order to attend work and school, and have requested village authorities continue to permit the use of *tambangan*. A balance has to be struck between safety regulations and the requirements of daily life.

At this point, Langgeng's goal for Banjarsari Rescue is to further improve collaboration by bringing the volunteer team into contact with village stakeholders, both business actors and the Banjarsari Village Government. Their oversight will ensure Banjarsari Rescue and Banjarsari Village Destana can better plan and carry out risk reduction measures that meet the specific needs of Banjarsari Village.

Infographics on the Condition of Banjarsari Village, Bojonegoro Regency, East Java



Problems faced by youth in Banjarsari Village, Trucuk Subdistrict, Bojonegoro Regency of East Java:

- 1 The southern side of Banjarsari Village on the bank of Bengawan Solo is prone to flooding and landslides.
- 2 The strong currents of Bengawan Solo pose a drowning risk.



Impact of the existing problems:

- 1 Flooding occurs almost every year, disrupting business and agriculture.
- 2 The risk of landslides has led to forced relocations.

Banjarsari effort to solve the problems:

01 Formed a community of rescue volunteers—X23 Rescue—to perform flood response duties such as community assistance and search and rescue.

02 Continue to develop their disaster preparedness and search and rescue skillset by training and networking with other volunteer communities such as BPBD Bojonegoro and Basarnas.

03 Merging X23 Rescue with the formal Destana forum in order to collaborate with youth from other nearby villages in jointly designing and realising a disaster risk reduction program based around local needs.



Preserving Barongan as the Land Shield

By the main road passing Mlaten Hamlet of Kebomlati Village, Plumpang Subdistrict, Tuban Regency, East Java Province, there stands an open building, 4 × 10 metres with walls and floor of bamboo. To its rear grow dense bamboo groves, and beyond that the gentle *Bengawan Solo*.

In early April 2023, craftsmen were gathered there, busy weaving bamboo strips to create rooster hutches, containers for rice and food, trays for carrying. That building is the centre of Bamboo Weaving Education Tourism, where visitors come to learn the art of bamboo weaving from local experts.

Kebomlati Village, some 30 km south of the regency capital, is not simply a village ‘by a river’—it is in fact surrounded by *Bengawan Solo* at its east, west, and south sides. Kebomlati is situated on a fluvial plain, which occurs due to flood sedimentation or river stream erosion. The rising and falling tides of *Bengawan Solo* have always been the backdrop of the villagers’ lives, and over generations they have adapted to the river to ensure their livelihoods.

Muchlis Johan Wahyudi (Johan), a youth figure of Kebomlati explains that bamboo groves are often called *barongan* by locals, because they offer protection from the perilous river. The *barongan* has been maintained for generations by Kebomlati villagers, and indeed the areas where the bamboo grows have been protected from erosion, while unprotected portions of the riverbank are now long since under water.

‘Since I was a boy and since my father was a boy, *barongan* have been there, but not all of them are still around. Landowners will sometimes cut down the bamboo if they feel their lands are not threatened by landslide’, Johan explained.

The art of bamboo crafting has developed alongside the presence of *barongan*, and been passed down for generations. Jubaidi, the head of Kelompok Sadar Wisata (Tourism Awareness Group) or



Johan Wahyudi shows the area of the land that has been lost on the banks of the Bengawan Solo in Kebomlati Village due to erosion.

Pokdarwis, said 'The profession of bamboo crafting might be as old as the *barongan* itself'. It is the engine of the Bamboo Weaving Educational Tourism project, launched formally at the end of February 2023.

Disappearance of land caused by erosion

The idea of developing Bamboo Weaving Educational Tourism came from the villagers' concern not over flooding, but over erosion. According to Johan, despite Bengawan Solo encircling Kebomlati, villagers have been relatively calm about the possibility of flooding. There is no particular preparation: no evacuation shelters or logistics management policy. A massive flood hit the village on New Year's Eve of 2008, but there has not been anything as bad since.

For most people living at the banks of *Bengawan Solo*, the river was used for bathing, washing and defecation, but around 2007 with the digging of household wells, preferences began to shift. 'With a background like this, flooding has never been a great concern to the villagers, as long as it's not really massive. People are quite casual about the possibility of such a natural disaster', said Johan. Lately, it's not so much the flooding or the declining quality of groundwater that's raising people's concern, as much as the erosion. From Johan's observation, the erosion has caused a land area of more than 100 metres wide and 20 metres deep to disappear.



The land in Mlaten Hamlet which has been supported by gabions is still being eroded. In the distance, bamboo groves appear to be more able to protect the land from erosion.

The erosion affects land where bamboo does not grow. The already barren lands at the riverbank are prone to erosion, and it is impractical to prevent further erosion by replanting bamboo, as it takes significant time to grow but erosion is an immediate threat.

A footpath connecting hamlets around Mlaten was also lost to erosion. Mlaten Hamlet is one of 3 hamlets in Kebomlati Village, next to Ngeblek and Boan. Mlaten Hamlet comprises 3 settlements of Ngingas, Ngablak and Mlaten. Erosion has hit hardest at Ngablak, whose inhabitants are mostly fishermen on *Bengawan Solo*. In light of the damage done there, the bamboo groves are slowly being brought to revival, beginning with Mlaten.

Disaster preparedness campaign

The Bamboo Weaving Educational Tourism project is reintroducing the benefits of bamboo as a river fortification. While the tourism side is good for the local economy, it also promotes the utility of bamboo in addressing environmental issues. Over time, as villagers take the threat of flooding less seriously, they can also start to underestimate the value of bamboo as a productive commodity. A number of bamboo groves have been cut down and replaced by other plants considered to be more profitable, such as vegetables or other crops. Some past groves are left bare and become newly vulnerable to erosion.

Jubaidi describes the local impact of Bamboo Weaving Educational Tourism. 'We also get visitors from nearby villages on the bank of *Bengawan Solo*. They can see with their own eyes the impact of planting bamboo at the riverbanks. Bamboo for crafting can be obtained elsewhere, far from the river. They don't have to cut their own', he said.

The centre takes around 350 visitors every weekend, mostly schoolchildren and women's groups of Tuban Regency. Each visitor is charged IDR10,000. Visitors can attend workshops run by local craftsmen and take their creations home with them. The increase in tourist activity has been a great positive for the village, as craftsmen can earn money selling their work, as well as by training visitors.

Ayu Anita, the treasurer of Bamboo Weaving Education Tourism's Pokdarwis has described the effect of the activity on the women who take part. Currently there are 9 women, aged from about 20 to 30, who have become Pokdarwis members. They inherit the profession from their predecessor. 'It's quite unlike the times of their grandparents or great grandparents. These days, craftsmanship is not the main source of income. These women are university students, teachers and housewives', Ayu explained. They were initially very reluctant to speak publicly and it took at least 3 training sessions, conducted by committee members from the Pokdarwis, to prepare them for the work. These women are now gaining valuable experience and can enjoy a supplementary income. The impact of educational tourism can be seen here, from teaching income as well as merchandise sales.



Bamboo weaving workshop in Kebomlati Village.

To preserve conservation-based tourism, craftsmen have decided not to harvest bamboo that grows at the riverbank. 'We don't use bamboo from Kebomlati anymore. We source it from other places, outside the village, so that our own bamboo can keep growing. We live side by side with *Bengawan Solo*, so we know how urgent it is to protect our land from erosion. Without the bamboo, this land could collapse at any moment', Jubaidi explained.

Jubaidi believes that Bamboo Weaving Educational Tourism will continue to expand. One possible route is by combining educational and ecological tourism based at the river. By adding, for example, fishing trips to the burgeoning list of activities, the number of villagers taking part in local tourism in their own village will increase. The government of Kebomlati is greatly encouraged by the involvement of more and more villagers and is on a path to making tourism the centrepiece of the village economy.

Not idly waiting

Moenedjan, the head of Kebomlati Village, believes a tourism economy based on the village's inherent potential will be a great benefit to the villagers' lives. There are around 3,200 people living in Kebomlati, with 1,160 heads of family. The majority of the villagers are farmers, but over the past

3 to 4 years farming has faced a decline. 'This decline has led us to create a tourism village, based on our culture of bamboo weaving and soon based on the river too', said Moenidjan.

Combining tourism and disaster preparedness by turning bamboo into an icon means that opportunities for the villagers can also benefit the village. Villagers can express their creativity through bamboo craftsmanship, while also mitigating the risk of living so close to the river stream (DAS) of *Bengawan Solo*.

Moenidjan stressed that the village government would always encourage villagers to find solutions to the problem of living on *Bengawan Solo* by embracing those problems and transforming them through creativity and innovation into something positive. 'If we stood idle we would be beyond help'.

Kebomlati village government has spearheaded an initiative to use a portion of village-owned lands as a relocation site for 150 Ngablak families whose homes were destroyed in a landslide. Families have been exempted from the taxation of land and building ownership, which is to be covered by Moenidjan at his own expense. The village government and villagers are working together to structurally reinforce parts of the land most vulnerable to collapse.



New hardwood trees are starting to grow on the land affected by erosion in Dukuh Ngablak, Dusun Mlaten, Kebomlati Village, Tuban.

Anita Ursula Prahtining, facilitator of Disaster-Resilient Village (Destana) in Kebomlati speaks of the contribution from village government and villagers in building these reinforcements. The activity is also supported by Subnational Disaster Management Agency (BPBD) Tuban and Bengawan Solo River Basin Organization (BBWS). 'Villagers offer a hand, and others contribute materials to build something of steel wires and stones. We built along a 100 metre line, but it took less than a year for the ground to collapse 2 metres under', she explained.

Moenidjan added that no matter how resilient the villagers may be, outside help would always be needed. In Kebomlati, assistance is needed to build permanent embankments to prevent erosion from claiming more of the village, especially in the areas more barren and prone to erosion.

As they have always done, the villagers and village government chose not to wait for help to come but chose to act. They have started something new by preserving and incorporating bamboo into their two-pronged plan: strengthening their economy and guarding against natural disaster. Like the bamboo of the *barongan*, their resilience will guard them for generations.

Infographics on the Condition of Kebomlati Village, Tuban Regency, East Java



The altered landscape/land area of Kebomlati Village after the erosion caused by Bengawan Solo river stream.

Problem faced by the villagers of Mlaten Hamlet, Kebomlati Village, Plumpang Subdistrict, Tuban Regency, East Java Province:

- 1 The village is surrounded by *Bengawan Solo* on its east, west and south, and there is a high risk of flood and soil erosion.
- 2 The local wisdom of planting bamboo at the riverbank to prevent erosion has been gradually discarded as bamboo is not seen as a valuable crop economically.



Impact of the Problem:

- 1 A number of bamboo groves have been cut down and replaced with other crops, which are not as effective in strengthening embankments. Some lands are left bare, and these are especially vulnerable to erosion.
- 2 It is particularly difficult to revive barren land with the planting of bamboo because bamboo takes time to grow, but erosion is constant.
- 3 The land lost so far to erosion is estimated to be more than 100 × 20 m..

Villagers' effort to solve the problem:

- 01 Initiating the Bamboo Weaving Educational Tourism project has increased the income of bamboo craftsmen and the women of the village and made tourism into a means of promoting the benefits of using bamboo as a natural shield against the river.
- 02 Continuously evaluating and innovating through the Bamboo Weaving Educational Tourism project so that fresh ideas continue to appear for integrating river-based tourism and educational tourism in order to get more villagers involved.
- 03 Sourcing bamboo as a crafting material from outside the village, so villagers will not deplete bamboo crops at the riverbank.
- 04 Building strong cooperation between villagers and the village government to reach solutions for the mitigation of future natural disasters, such as securing support from capable institutions for infrastructure development to keep erosion in check.



Livelihood Adaptation in Response to Disaster

Routine flooding that covers crops and ponds for weeks is a great frustration for anybody whose livelihood depends solely on farming. But this is not the case for farmers living at the banks of *Bengawan Solo*, especially in Bulutigo Village of Laren Subdistrict, Lamongan Regency, East Java Province, who have chosen to turn the situation to their favour.



M. Rozim Arista, Head of Bulutigo Village, Lamongan.

Mohammad Rozim Arista (Rozim), head of Bulutigo Village, has encouraged villagers to accept their situation and spend their energies on turning things around in their own way. The villagers of Bulutigo have felt that they were not prioritised in the development program, compared to other villages closer to urban areas, but Rozim says he has always encouraged villagers to ignore that. 'Our energies are best spent on finding a way to turn things around ourselves instead of waiting for help', he said.

Bulutigo Village is right on the banks of *Bengawan Solo*, and at its south is a high embankment. Most of Bulutigo Village area is lower than the embankment, and at its north the land grows steadily higher. This rare geographic situation means the village lands are like a bowl, and flooding takes a long time to drain out.

The secretary of Bulutigo Village, Ahmad Hambali, recalls the flood of New Year's Eve 2008. Flood waters reached 3m in some areas, and the village remained flooded for more than a week as villagers sought refuge at high ground. Not only were their houses submerged, but vital infrastructure such as schools and public service offices were damaged by the flooding. Fields and ponds were affected too, and the economy suffered greatly as more than 80% of Bulutigo's 3,400 inhabitants rely on farming for their primary or supplementary income. Based on data taken from Statistics Indonesia (BPS) in 2021, around 326 ha of the village's total area of 358 ha consisted of farmland or ponds.

Damage to roads has persisted to today; a 7 km road stretching from Laren Market to Bulutigo Village is still uneven and full of potholes, which has made travel and commerce difficult. After years of this, the farmers have moved to affect their own change and find a solution.

Electric water pump

Farmers have split the use of land between farms and ponds at lower levels, and for horticultural plants at higher levels. This strategy was enabled by the donation of an electric water pump from Lamongan Regency in 2012.

At the time, farmers already owned water pumps, but these depended on diesel and so as the price of the fuel increased, the electric pump became an indispensable replacement. Farmers could drain water from *Bengawan Solo* to their farms as needed, and drain floodwaters from their land back to the river. According to Rozim, the new pump has played a major role in changing the lives of Bulutigo farmers. The improved water circulation has given them an additional harvesting season in the year: 3, up from the previous 2.

Following the construction of Gerak Babat Reservoir on *Bengawan Solo*, some farmers have experimented with combining rice and fish farming, especially at the lower-level farmlands. In the rainy season they plant rice, and in the dry season they use the same land to make ponds for breeding fish stock, commonly mixed species like vaname prawn and milkfish.

It is difficult to count exactly the amount of money the ponds can generate, as fish varieties bred there are not specific, but the results are always positive. According to Sutrisno, a pond farmer, his income in every harvesting season has ranged from IDR15–50 million per hectare. Although the income from rice is more predictable and this more stable, revenue from farming fish is overall greater. ‘The calculation is made for one-hectare pond area, while actually the real size is less than one hectare. It’s around 60% of that, if we exclude the area on which the embankment is built’, said Sutrisno.

Statistics Indonesia (BPS) data from 2021 shows ponds occupying 105.2 ha of Bulutigo Village, producing 126.6 tons of fish and prawn. These figures have prompted the village government to seriously facilitate pond farming by, for instance, improving road access to pond areas. The roads are still regularly submerged during heavy rains, so farmers tend to travel to their ponds by boat.

Melon changes the story

Besides rotating land use between rice and fish, another significant breakthrough by the villagers of Bulutigo came in 2015 as they began to cultivate melon crops on the high-level land. Melon has a harvesting season every 60 days and this rapid cycle has improved the village economy and increase the income not only of the farmers, but also of farm hands—generally women—who have been absorbed into the harvesting process.

According to Statistics Indonesia, Bulutigo has become the main producer of melon in Laren Subdistrict at more than 100 tons per year. Rozim explains that the price of melon is normally around IDR15,000/kg if the melons are shipped directly to Jakarta. In 1,500 m² of land, 4,000 melon stems can be planted, to a gross revenue of around IDR70 million. Minus expenses, farmers could take home IDR40 million every 60 days.

‘For such spacious land, farm hands will always be needed; at least 2, and during harvest at least 10. If melon farms occupy more than 4 hectares, they can employ around 400 people. Melon farming has become so popular that Bulutigo farmers are beginning to rent land in neighbouring villages for their melon crops’, adds Rozim.



Currently, melons are widely cultivated in several villages on the banks of Bengawan Solo, East Java.

Higher ground can only be used for farming when farmers have the option to pump water from *Bengawan Solo*, which is where the electric water pump has proven indispensable. The new employment opportunities have also kept young people in the villages, eager to stay and earn an income. The extra money also means more funds can be allocated for disaster mitigation, such as land-strengthening embankments (TPT) that encircle Bulutigo Village, especially around flood-prone areas. A small change has made the village more prosperous, and more resilient.

Other Risks

Since the Great Flood of 2008 there has been nothing as bad. The new water pump has proven more than capable of draining floodwaters from the farmland. However, that is not to say Bulutigo Village is now free from the risk of natural disaster. Soil erosion caused by *Bengawan Solo* is a constant threat.

Rozim explains that, so far, 2 hectares of land has been lost to erosion, mostly after Gerak Babat Reservoir was built. The regular process of opening and closing the reservoir gate is compromising the riverbed; with the gate closed, the land begins to dry out, but as the gate opens, the partially dried land is rapidly flooded and soil is diluted and carried away by the flowing water. The village government cannot do much to remedy the situation directly, Rozim continues, because normalisation of river current is not under its authority.



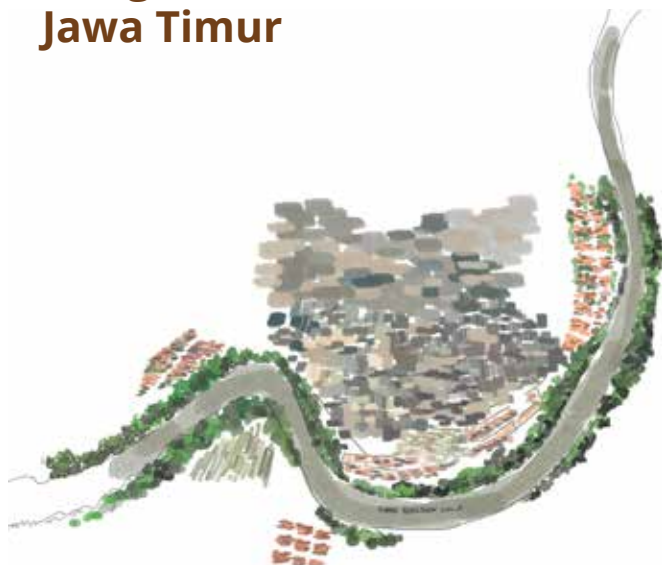
Ahmad Hambali shows the land boundaries of Bulutigo Village which have disappeared due to erosion.

Besides this, road access is another significant problem to the people of Bulutigo. Since the start of 2023, the concrete road above the embankment, long used as a main road, has begun to collapse. There is a detour available, but even before the collapse began, the main road was not ideal. Its 3 metres width does not provide comfortable space for 2 cars to pass, and even motorcycles struggle. Drivers must take additional care as both sides of the road are a steep slope and there is no safety barrier. 'The collapse of the main road could be a disaster for us', said Rozim.

To Rozim, 'disasters' are not just natural, like the flooding of *Bengawan Solo*. They are also social and economic, which in some ways affect the villagers' lives more directly. Damage to the road will cut travel to and from Bulutigo, which halts the movement of produce and forces farmers to pay middlemen instead of selling direct to market. Rozim hopes that stakeholders like the regental government and BBWS Bengawan Solo could coordinate over solutions to problems that are beyond the abilities of the villagers alone. The people and government of Bulutigo Village are ready to cooperate.

'As the inhabitants of the village, we constantly innovate to be more independent and ready to face any disaster, without waiting for help. But there are still things we cannot manage alone', he said.

Infografis Kondisi Desa Bulutigo, Kabupaten Lamongan, Jawa Timur



Bulutigo Village overhead visual

Problem faced by farmers in Bulutigo Village, Laren Subdistrict, Lamongan Regency, East Java Province:

- 1 The land on which Bulutigo Village is built is at the bottom of a basin because its geological surface is shaped like a bowl, which means that floodwaters from *Bengawan Solo* take far longer to drain or dry up.
- 2 Main road access above the *Bengawan Solo* embankment has collapsed in some sections and cannot accommodate traffic.

Impact of the problems:

- 1 Pooled floodwaters make farmland unproductive and cause great economic losses to farmers.
- 2 The damaged road means villagers' activities are curtailed, and farmers cannot sell goods direct to market and lose income to middlemen.



The solutions developed by villagers and village government:

- 01 Farmers have divided their land into planting areas based on soil altitude. The lowest and wettest area is used for rice and fish farming, while the higher areas are used for melon farming. This strategy is facilitated by the availability of an electric water pump and enables farmers to increase revenue and increase the size of their workforce. Young people are able to find work in the village instead of having to move to the cities.
- 02 Villagers and the village government are working hand-in-hand to build necessary infrastructure, including by sending works proposals to relevant authorities.



Mangrove Restoration for Estuary Conservation

In early April of 2023, not far from the fish auction of Pangkahkulon Village in Ujungpangkah Subdistrict, Gresik Regency, East Java Province, near the Bengawan Solo estuary, a number of workers were seen busy painting bird statues no less than two high meters. Painted predominantly white, with its customary yellow beak, The Australian pelican (*Pelecanus conspicillatus*) statue stands out among the greenery of the mangrove forest around it..

This and similar statues are placed around to signal entry to the Mangrove Forest tourism area. This place, which has developed near the Bengawan Solo estuary and directly borders the Java Sea, is named 'Cisiu Island of Pangkahkulon'.



The entrance to the prospective Pangkahkulon conservation-based mangrove tourism area.

Cisiu Island is under development to become a tourist destination based around natural conservation, with its mangrove trees as its main attraction. Mangroves on Cisiu Island grow grouped in different locations, each separated by a pathway that allows villagers access to the island's fishponds. Tourists can reach the island by boat, travelling from a pier not too far from the main gate of the island. The dock is presently under construction but will measure 4 × 5 metres and stand on the bank of Kalingapuri River, the branch of *Bengawan Solo* which flows through Pangkahkulon Village.

In the mangrove forest, a group of pelicans can sometimes be seen resting on the branches. On Cisiu Island the presence of pelicans is regarded as a positive sign, and as the mangroves grow again, pelicans are beginning to use the island as a transit point during their migration. The bird is expected to become a tourist attraction, along with the island's natural beauty. This is the reason pelican statues are used to guide visitors to the mangrove area.

The diligence and passion of the workers painting those statues speak to the dreams of the villagers who hope to start a conservation site and tourist destination. Robah, the head of Social Supervising Group (Pokmaswas) of Pangkahkulon admits that the idea did not happen overnight. Robah and his fellow villagers had been sharing their thoughts on mangrove rehabilitation since 2010 until the

plans became concrete. The village government of Pangkahkulon welcomed the idea and plans to build were laid out little by little.

Construction has progressed to 40%, including a wooden bridge already stretching 200 metres from the main gate. 'This is the fruit of our dream to create a mangrove tourism site based on natural conservation', said Robah.

When nature turned



Robah, Chair of the Pokmaswas Pangkahkulon Village.

Before the idea of a mangrove tourism site entered Rohan and his friend's heads, they worked as fishermen, not particularly caring for the condition of the mangrove forest on Pangkahkulon. But, with news of dam construction on *Bengawan Solo* and a declining catch adding to their concerns, circumstances forced their hand. 'Before 2010, we could sustain ourselves for 2 years with 4–6 months of seafaring', Robah recalled, 'but since 2010 it's been nothing like that'. Robah received information from the East Java Provincial Government that 60% of the mangrove area in Ujungpangkah had been damaged, which opened his eyes to the connection between the environment and his livelihood.

'Before 2000, Ujungpangkah seemed to be blessed by nature. Fish filled our ponds, we barely had to buy food for them. After 2000, they began to die. We turned to milkfish, which we had to raise from seeds (roe) we bought. Freak waves would often sweep our fish crop away', explained Robah.

There are other factors putting fisheries at risk too. Waste carried by the river from industry upstream contaminates the ponds and kills fish and prawns. Industrial waste dumping had reached a volume that the river cannot filter naturally. This was the final straw for Robah and his colleagues. The solution—the restoration and conservation of the island's mangroves—was in reach and now they are at the forefront of this project.

'Our initial intention was to save the estuary's ecosystem. We had to prevent further damage, and ideally return the estuary to its previous condition', Robah said. He and his friends sought assistance from related stakeholders, in particular industries in Ujungpangkah. In 2010 they received a first donation of 15,000 mangrove seeds from the Seafaring and Fishing Agency of East Java Province. These were planted at Cisiu Island in the area now under development to become its main tourist attraction.

Private sector entities were also moved to contribute to the project as part of their corporate social responsibility (CSR) programs. PT. Smelting assisted in planting 40,000 mangrove seeds between 2015 and 2020; Petrokimia and Semen Gresik each committed to planting 20,000 seeds and PGN Saka offered an annual commitment to planting. Additional government agencies from East Java, Central Java and Bali joined the project and the size of the planting area has now reached more than 150 ha.

'There is still 350 hectares more to be reforested, all of it the village's land and all being managed by the villagers. This is a completely community-driven endeavour', said Ahmad Fauron, head of Pangkahkulon Village.

The difficult mangrove

Both Robah and Fauron stress that the proposals of mangrove restoration were not based on profit or popularity. Not many understand how difficult mangrove planting can be, and the process of obtaining seeds is just as challenging. There is no nursery in Pangkahkulon, so seeds have to be shipped from as far as Tuban Regency. The seeds have to be planted in waist-deep water, so additional work on fencing and land reinforcement is required to protect the seeds from the currents while they grow. The workforce, equipment and transport to and from the island are no less costly. For example, the cost of a planting project held by Seaside and Ocean Resources Management Agency of Denpasar in 2021, which planted 177,000 seeds, amounted to IDR760 million—far beyond what a village community of fishermen and farmers could be expected to cover.



A number of workers are busy working to build the conservation-based mangrove tourism area in Pangkahkulon Village.

Maintenance accounts for further expenses. Routine observation of mangrove plantations is required for at least 6 months. Robah and his friends from the community, only 10 people in total, perform this delicate task without assistance and without compensation. ‘We are quite overwhelmed by the responsibility of supervising hundreds of hectares of mangrove. Governments budget for planting, but without care and supervision, we might plant tens of thousands of seeds and leave only 10% of them alive’, Robah admitted.

Putting an end to mass planting

The difficulty faced in planting and maintaining mangrove trees has led Robah and his friends to abandon the mass planting strategy. Ideally, seeds are planted in July–August, sometimes as late as September. Any later and there is a high probability of failure during shifting season: strong currents and wind will sweep away any seeds that are not yet deeply rooted. Institutions contributing to the project would insist on their own schedule, despite knowing it was not a simple matter to make estimates about mangrove growth.

Therefore, Pokmaswas Pangkahkulon and Pangkahkulon village government initiated the project of conservation-based mangrove tourism to replace mass planting projects, learning from the mangrove communities in Muara Angke, North Jakarta who have had success with projects based around more limited planting. There, individuals or institutions can purchase only the seeds they will be able to plant and care for, and so guarantee adequate maintenance for the plantation. This approach can reduce the risk of planting failure or seed damage, and limits opportunities for the corruption which is possible in large-scale projects. Cooperation between villagers and stakeholders also continues for far longer than with mass planting.

A downside of conservation-based projects is that they entail a smaller workforce, limiting their potential to create jobs. One solution to this drawback would be to offer alternative opportunities to generate income, such as by permitting workers to open stalls, manage parking or operate other

tourist attractions in the park. Many of the people involved in the project previously worked on illegal mangrove logging projects, so their continued employment in conservation and tourism is critical.

Preventing ecological disaster

Illegal logging projects have been the primary catalyst of mangrove forest damage in Ujungpangkah. Villagers were at their wits' end trying to find ways to make a living and with no other options turned to logging. Although the mangrove reforestation project was initially not well received by the loggers, the logging projects have now ceased and all their workers are reemployed. As the reforestation has assisted in the restoration of healthy waterways, many of the former loggers have been able to become fishermen.



Syaiful Arif, facilitator of Destana Pangkahkulon.

Robah's work has also improved local knowledge of how the mangrove ecosystem functions. Farmers believed that mangroves would hinder wind circulation in their ponds, but now understand that the mangroves are where the fish lay their eggs, and so preserving them is directly beneficial to fish farming. According to Syaiful Arif, facilitator of Destana of Pangkahkulon Village, the mangrove forest is an effective guard against shore abrasion, absorbs toxins in the water, and provides a haven for fish to multiply. Healthy mangroves mean more fish and crabs, and the more people support the project the greater the benefit will be to the environment and to the village.

Syaiful also stresses the importance of recalling the role of ecological disaster in damage to the river system. 'We are not just talking about flooding and erosion. The toxins and ecological damage in Begawan Solo, in particular to our estuary, are knock on effects from natural disaster. We need to prepare for and take action to mitigate damage from future events, not simply restore the forest', he added.

Ujungpangkah has for some time been a transit site for birds migrating from Australia. The pelican transit site area is included in the Ramsar Convention on Wetlands and therefore should be protected. Once construction is completed and the mangrove is restored, the area can become home to hundreds of pelicans, which will add to its tourism potential. The beauty of Ujungpangkah deserves to be enjoyed and protected.

Taking care of each other

After succeeding in the reforestation of Ujungpangkah, villagers hope to learn more about the potential of mangrove trees. According to Fauron, villagers have received valuable information from Central Java about another community that is producing goods from mangrove trees, such as food and souvenirs.

'Once the site is complete, there will be stalls selling mangrove fruit and seafood. The village will be able to earn income and villagers will enjoy improved economic conditions on the back of mangrove conservation. Stakeholder interests will also be properly channelled. Improving the health of the ecosystem goes hand in hand with improving the economy', said Fauron.

It is hoped the site will be ready for tourists at the end of 2023. The project continues at modest pace, but always with hope for the future of the estuary and the health of the village.

Infographics of Conditions in Pangkah Kulon Village, Gresik Regency, East Java



Problems faced by fishermen and pond owner in the Bengawan Solo estuary, Pangkahkulon Village, Ujungpangkah Subdistrict, Gresik Regency, East Java Province:

- 1 Mangrove forest damage caused by logging.
- 2 Toxic industrial waste dumped in *Bengawan Solo* river.
- 3 The construction of a dam on *Bengawan Solo* is a catalyst for reduced fish population.

Impact of the problems:

- 1 Declining fish and prawn populations due to mangrove destruction.
- 2 Damage to the mangrove forest weakens the shoreline against abrasion from wind and waves.
- 3 Reduced catches harm the villagers' economic condition.

The efforts of Pokmaswas of Pangkahkulon Village to solve these problems:

- 01 Seeking cooperation from public and private sector to initiate mangrove reforestation.
- 02 Inviting Pangkahkulon village government to join the reforestation project.
- 03 Inviting former illegal loggers and other villages to participate.
- 04 Continually evaluating the planting and maintenance pattern of mangroves in order to formulate an effective planting strategy that includes monitoring and seedling protection.
- 05 Delivering the idea of conservation-based tourism that will involve villagers directly in order to safeguard the integrity of the work.



Building a River Community Solidarity Network

Rivers flow in so many places across the Indonesian archipelago, but what inspires the people living on the riverbanks to join a collective effort to protect their environment? For Usman Firdaus who has spent 17 years working with Ciliwung Ciliwung Care Community (Mat Peci) to examine the dynamics of the problems facing Ciliwung River in the Special Region (DKI) of Jakarta, the answer is the volunteerism spirit of the community.

Usman noted that due to its proximity to the nation's capital, Ciliwung is frequently in the news, but it almost always concerning flooding, pollution and garbage, which shows how the human factor has so much impact on Ciliwung. However, it is precisely because of this human factor that community can become the key. Currently, there are many approaches and technological innovations in solving the problems related to the river. In that context, Usman argues that the problems cannot be solved with technology alone. The people must be included in the discussion. 'It's this human aspect that matters. We can use any technology to clean Ciliwung waste, but it will not be sustainable if the human aspect is not considered', he explained.

I Gusti Rai Ari Temaja or Gung Nik from the River Care Community (KPS) Denpasar, Bali, agree. 'This is not just about cleaning the river, but how to transform the habits and mindset of the people', he said.

Both Usman and Gung Nik share the same beliefs about how to approach river protection. For example, there is a systematic plan to fish rubbish out of rivers that has been applied successfully in a number of rivers in Java and Bali. These types of interventions have their place, but in the River Basin Area (DAS) the human factor cannot be ignored. The health of the river depends on a reciprocal relationship with the people that live on it, and so in order to lead the River Basin Area into self-maintained conservation, education must encourage the growth of a spirit of volunteerism.

The river community operating along the banks of Jeneberang River, Gowa Regency, South Sulawesi shares this viewpoint. Kaharuddin Muji of the Jeneberang river community of South Sulawesi recalls the flooding of 2004 and takes it as a constant reminder of the need to remain alert and adaptable to the risk of natural disaster. The daily reality of this possibility means the community's autonomous participation in River Basin Area revival is especially vital. Three organisations: Mat Peci in DKI Jakarta, Tukad Bindu in Bali and River Community Network in South Sulawesi built the movement from scratch and continue to manage and act without outside input.

Indonesia's River Basin Areas are in a critical condition, and the emergence of river conservation and management communities such as Met Peci is not important only for its own sake, but because their initiative can serve as inspiration for other river communities to organise and act.

Bridging the communities

The importance of river communities is one of the main topics in the River Basin Area Community Discussion, part of the string of final events for National Disaster Preparedness Day (HKB) 2023.

In attendance was head of BNPB, Lieutenant General Suharyanto, S.Sos., M.M. of the Indonesian National Armed Forces (TNI).

The discussion session, titled 'The Resilience of River Basin Area (DAS) Communities' was held at Karangbinangun Subdistrict Hall, Lamongan Regency, East Java Province in mid-May, inviting members of river community organisations to ignite discussion. Namely, Kaharuddin Muji of DAS Jeneberang, South Sulawesi; Usman Firdaus of DAS Ciliwung, DKI Jakarta; I Gusti Rai Ari Temaja of DAS Tukad Bindu, Bali; Robah of DAS Bengawan Solo, Gresik, East Java; Jana Marlina of DAS Ogan, South Sumatra; Vivi Norvika from DAS Kapuas, West Borneo and a member of Dompot Dhuafa, Arif Rahmadi Haryono. The discussion was held by BNPB with the support of the SIAP SIAGA Program, a joint program between Indonesia and the Australian Government. Responses were heard from Professor of Pertahanan University, Syamsul Maarif; water resource expert from Gadjah Mada University, Agus Maryono; Deputy of Logistics and Equipment of BNPB, Lilik Kurniawan and SIAP SIAGA Gender Specialist, Lutri Huriyani.

The talks were an opportunity for river communities to share the successes of their movements, and their views on resilience. Despite their limitations, there had been some real successes and it was beneficial to share these with others in similar circumstances working towards similar goals.

Clean-up and conservation are only part of river communities' work. Beyond that, they are involved in educating locals in domestic waste management to reduce river dumping, and encouraging volunteer shoreline planting of trees and vegetables. Efforts like these can put local level conservation on a path to being self-sufficient and self-maintaining. River communities have also assisted in expanding



the scope of risk management, for example by providing early warning systems based around readily available communication devices such as cellular phones, walkie-talkies, klaxons and so forth.

The talks also revealed some successful cooperation and information sharing between river communities. Mat Peci, Tukad Bindu Community and Jeneberang River Community are regularly in touch, sharing their experiences and discussing how they could be adapted to specific local needs. Unfortunately, these successes were not widespread. Women's Community of Musi River Care (KPPSM) of Palembang, South Sumatra first learned of the existence of other river communities at this discussion meeting. KPPSM representative Jana Marlina admitted her community was only formed in 2020, but was pleased to see what was possible. Robah, chairman of Pokmaswas Pangkahkulon, Gresik, East Java, faced a similar experience. He and his friends had been working alone on the reforestation of mangrove areas in Ujungpangkah since 2010 with no knowledge or connections to other river communities. Like Jana, he hoped for a chance to visit and learn from one another in future.

Moch. Khozin, chairman of Farmers' Central Association of Water Supply User (IP3A) and a participant from Lamongan Regency, echoed this sentiment as he expressed his concern for the farmers of Lamongan in light of regular flooding from the Bengawan Jero river. He hoped in future to communicate with other river communities on solutions to the problems they had in common.

Keep learning and sharing

The speaking presentations were received positively by all present. Professor of Pertahanan University, Syamsul Maarif stated that the central government had an obligation to reach out and offer tangible support to river communities, echoed by Deputy of Logistics and Equipment BNPB, Lilik Kurniawan. 'When the people show initiative, local and central government should move to facilitate. Further discussion here would be warranted, to ensure these programs can be run with a minimum of risk', he said.

Agus Maryono, expert on water resources from Gadjah Mada University praised the efforts of the speakers and their organisations thus far. By their own initiative they were able to implement a system of integrated water management, crucial to the process of River Basin Area conservation. 'Campus scholars are yet to consider a fully comprehensive approach, so it is crucial that universities and government agencies be encouraged to consider the importance of *integration* to a River Basin Area conservation program. Disaster mitigation must be coordinated with a goal of prosperity, not merely resilience. Mitigation can grow into economic improvement', he explained.

SIAP SIAGA Gender Specialist Lutri Huriyani spoke of the potential to organise women and people with disabilities in River Basin Area conservation, urging stakeholders to not overlook their potential. 'When discussing River Basin Area conservation, it is important to include women, children and people with disabilities in the collaborative process', she said.

In a closing address, Lieutenant General Suharyanto praised the initiative and action of the river community volunteers, calling them the guardians of the river, which is the heart of life, and pledged BNPB's full support. 'In the field, BNPB will have your back', he said.

For river community volunteers, the forum was an opportunity to present on their own experience, but more than that it was a chance to share their spirit with one another. To ignite awareness of the problems facing river communities across Indonesia and remind themselves to remain steadfast in their work. Continued learning and sharing will keep this spirit alive.

Epilogue

Ensuring the Involvement of All Elements of the Communities to be more Resilience



Lutri Huriyani

Gender Specialist, SIAP SIAGA

Community resilience will be achieved only when every element in the community is able to develop its own resilience. Efforts to enhance community resilience against various disaster risks needs to be carried out by ensuring no element of a community is forgotten, including women, vulnerable groups and people with disabilities.

The collection of articles in this book describes the struggle of community along the river basin (DAS) to deal with the daily risk of natural disaster. The messages of this book open our minds to the fact that there are many ways to protect the environment along the watershed.

The river communities along Bengawan Solo and Ciliwung (Java), Tukad Bindu (Bali), Jeneberang (South Sulawesi), and Kapuas River (West Kalimantan) whose works are recorded in this book have proven that the role of community is fundamental to protect watershed areas. Various problems along the watershed, from environmental damage due to deforestation, waste, to rubbish as pollutant in the rivers cannot be resolved without the involvement of community.

Encouraging people to get involved in river community organisations is not easy, but neither is it impossible, and the benefits are great. Often these movements commence from a small act of initiative by an influential community figure, which leads to habitual action by those around them to clean up rubbish, think more about waste management, plant trees, form voluntary rescue teams. These processes soon draw on local wisdom to inspire and inform their ongoing work, and river communities begin to see the thread connecting community development, environmental protection, waste management and disaster mitigation to economic growth and people's quality of life.

Most of the river communities featured in this book have recognised women's potential and accepted their involvement in waste management, managing the river school, joining disaster rescue teams, and activities up to and including coordinator-level responsibility. For example, a woman leads an organisation focusing on conservation of Kapuas River: Vivi Norvika, head of Sangsakha in Pontianak City, West Borneo. Despite small victories, the further involvement of women and other vulnerable people in river community activities will require greater incentives. The GEDSI philosophy (Gender, Equality, Disability and Social Inclusion) can inform the work of river community organisations and ensure an openness to the potential of all to take part and offer their unique skills.

Involving everyone

The GEDSI perspective is based on gender equality, inclusion, pluralism and social justice. In the case of river basin conservation, GEDSI should not only inform participation, but also the allocation of

benefits. All are responsible for the management and use of our environment and natural resources, but all should stand to benefit equally from them too, free from discrimination on the basis of gender, ethnicity, socioeconomic status or disability.

The role of equal access to these benefits is of great importance to increasing the resilience of women. Women who are menstruating, pregnant, lactating or in postnatal recovery in particular require access to clean water and face a risk of serious physical or reproductive illness if their water source is polluted. Babies and toddlers likewise require access to clean water and are uniquely vulnerable to serious illness. Addressing this need will empower women's resilience against gender-based violence by increasing their independence and access to basic resources. The specific needs of all vulnerable people should be carefully considered in apportioning out the rewards of river conservation efforts.

The successful integration of the GEDSI perspective is measured with 4 indicators: access, participation, control and benefit, which together will gauge a river community's success in integrating vulnerable communities into their work.

Access pertains to the guarantee that resources are in reach for women, vulnerable people and people with disabilities. In the context of DAS management, this could be achieved by ensuring access to vital information about disaster preparedness and informing people directly when a disaster has passed. It might also be something as straightforward as disseminating information about evacuation routes or guidelines on waste management, or how to contribute to reforestation programs.



Participation refers to a guarantee that women, vulnerable people and people with disabilities will be able to fully take part in a program, from inception to execution. Their full involvement will help ensure that any program remains relevant to the needs of socially disadvantaged and vulnerable people. The river school is integral in ensuring full participation, and access to the river school is a good proxy for participation in the community. River school teaching materials can rapidly be supplemented with information about reproductive health, children's and elderly care, and disability care, but care should be taken to include people with disabilities directly and not simply educate their personal helpers.

Control calls for the meaningful involvement of every level of the community in projects. This means the DAS conservation effort should offer not only participation in activities, but also meaningful participation in its decision-making process to ensure continuity and inclusivity.

Finally, benefit asks that all elements of the community be able to grasp the benefit of any program comprehensively. This means vulnerable and disadvantaged people must enjoy the positive outcomes of any program equally with other members of the community, but also that programs should be designed to *offer* fair benefits to all. In practice this includes access to knowledge on disaster preparedness and mitigation, but also access to social empowerment and economic development.

So how best to ensure that these 4 indicators are implemented in every community-based DAS conservation program?

External encouragement

The river communities whose stories have been told in this book are already at their limit, using every resource available as efficiently as possible in their efforts to save the river basin system. They cannot be expected to also implement GEDSI policies without some form of external support.

The GEDSI approach can be applied to any collective-driven effort to protect the DAS, and for the local government the integration of GEDSI perspectives is mandatory. President's instruction no. 9 of 2009 on the Mainstreaming of Gender in National Development Programs instructs every minister, head of non-departmental government agency, head of secretariat of high and highest public institution, governor and regent/mayor to implement gender mainstreaming according to the field, duty, function and authority in each institution.

Non-governmental organisations and private sector bodies share the same role in supporting river communities in integrating the GEDSI perspective with their work, but this work must be carried out in a manner sensitive to the values of each local community, including traditional society. Pentahelix partnership is necessary to invite river communities into the decision-making process and find a meeting point between the GEDSI philosophy and the needs of the community.

Women, vulnerable people and people with disabilities can and should play a vital role in the DAS conservation project, and by implementing the GEDSI perspective in DAS management we can ensure that the nation's natural resources will be managed with a mindset of continuity, inclusivity and fairness for all.

