C-PaCTS. Partnerships and synergies for knowledge transfer, coastal resilience and sustainable community development

Summary:

The project brings together Technische Universität München (TUM) in Germany, Institut Teknologi Bandung (ITB) in Indonesia, and Pwani University (PU) in Kenya to address a critical issue in climate change and sustainable development: the lack of effective dialogue and feedback loops between academic and community knowledge. Academic systems often operate within internal loops, while community knowledge remains localized. Additionally, academic knowledge transfers tend to follow a north-south orientation driven by funding opportunities. This project aims to bridge these gaps by fostering improved dialogues and partnerships between academics and communities, as well as enhancing exchanges between south-to-south and north-south academic institutions.

Rural coastal communities in Kenya and Indonesia face particularly high vulnerabilities due to climate change, pollution, unequal development, and land grabbing. These multifaceted challenges require integrated solutions that align with community perspectives. Currently, none of the Sustainable Development Goals (SDGs) are fully achieved in these areas, justifying the need for a participation program focused on action research, mitigation strategies, resilience building, and mutual exchange.

By leveraging the unique strengths of each partner university while simultaneously strengthening and enhancing existing structures, the project will position the institutions as leading experts on coastal issues, thereby providing them with a competitive advantage. Further, the north-south-south partnership aims to create a collaborative knowledge hub to bridge knowledge gaps between academia and communities. It focuses on innovative transdisciplinary approaches, establishing an international network of researchers, practitioners, and local communities to capture and enhance knowledge transfer mechanisms. The project integrates community-based knowledge with scientific insights, testing new methods in rural coastal areas, and addressing global challenges like climate change and biodiversity. Structured into four working packages, the project focuses on environmental sustainability and resilience, social inclusion and equity, educational transformation and capacity building, and institutional innovation and management.

The project supports multiple SDGs by integrating environmental, social, and transitional actions. Environmental actions focus on developing, protecting, and restoring coastal lands and ecosystems in alignment with community needs (SDG 13, 14, 15). Social actions promote gender diversity, spatial equality, and institutional transparency in resource access (SDG 5, 10, 16). Transitional actions aim to transform

educational programs to enhance coastal community resilience, foster community identities, and promote transdisciplinary thinking (SDG 4, 11, 17).

Resource sharing is a key aspect, with the project facilitating the sharing of research facilities, databases, and resources to support comprehensive research and increase impact through diverse dissemination channels. Additionally, it emphasizes sharing best practices in governance, strategic planning, and quality assurance to improve efficiency and service delivery within universities.

The project objectives align with the program by enhancing education, integrating SDGs into study programs, and advancing research and knowledge dissemination. By leveraging expertise from academia, practitioners, and communities, the project aims to advance teaching, research, and university management, ultimately supporting SDG achievement in rural coastal areas. These efforts aim to strengthen higher education's role in sustainable development and community engagement, effectively addressing global challenges.

- Enhancing Education and Training: Improving graduate training structures to align with SDGs and incorporate cutting-edge science.
- Developing Contextually Relevant Study Programs: Creating activities and modules at TUM, ITB, and PU that address SDGs, focusing on areas like Land Management, Geospatial Science, Environmental Science, and Education Technology.
- Integrating Research into Education: Embedding research findings into curricula to educate students on global challenges such as climate change and its impact on coastal communities.
- Prioritizing Global Challenges: Establishing climate change and coastal impacts as primary research priorities.
- Implementing Effective Knowledge Distribution: Promoting structured knowledge dissemination to enhance community resilience and address environmental challenges.
- Strengthening Organizational Structures: Enhancing university management capabilities to support educational and research goals.
- Integrating Community Engagement: Involving civil society in decision-making within TUM, ITB, and PU, aligning with higher education’s broader societal responsibilities.

Description:

Title: C-PaCTS. Partnerships and synergies for knowledge transfer, coastal resilience and sustainable community development

Partners: Technical University of Munich, Germany (TUM), Pwani University, Kenya (PU), Institut Teknologi Bandung, Indonesia (ITB)

Background / Problem description

A key problem in the domains of climate change and sustainable development is the lack of effective dialogue and feedback loops between academic and community knowledge. Academic review, publication and educational accreditation quality cycles tend to rely on internal knowledge-sharing loops, and community knowledge tends to be shared only within the communities. Moreover, most of the academic knowledge transfers tend to be too much north-south oriented, mirroring funding opportunities and requirements. To address these quandaries in teaching, educational management and research, the capturing and sharing of knowledge requires on the one hand improved dialogues and partnerships between academics and communities as well as improved exchanges and partnerships between south- to-south and north-south academic institutions. This project develops these partnerships in the context of coastal rural development.

Rural coastal communities are on average more vulnerable to effects of climate change, global ocean and ground water pollution, unequal spatial development, and land grabbing than inland and urban communities. These simultaneous problems require interdisciplinary and integrated SDG solutions which are aligned with how the communities see their roles in these solutions. Currently, none of the SDGs are achieved in these areas, which justifies this project to develop a participation program through action / participatory research / mitigation strategies or/and resilience building and specific mutual exchange. Three specific cases from Kenya, Indonesia and Germany exemplify and demonstrate the vulnerabilities of rural coastal communities. For Kenya, Jilani (2016) describes for the Kuruwitu and Mkunguni fishing villages at the coast of Kenya the type of knowledge that the local fishery communities have. Similarly, Handoko et al. (2023) describes for the coastal communities of coastal communities of Jogosimo Village and Tegalretno in Indonesia how the difference between insights and recommendation developed at central administrations significantly differ from the community practices and interests of the coastal communities, which significantly affects the potentials for sustainable resource management and resilience.Finally, Martinez (2021) portrays how the communities of Ummanz at the Baltic Sea Coast in Germany have been coping with the challenges of storm surges, heightened groundwater levels due to the rise of the sea level and the absence of measures such as levees, dams or designed flood areas, yet still chose to live with these risks in return for agricultural gains on land artificially reclaimed by their ancestors. All three examples

demonstrate that despite the challenges often these communities have maintained their own community practices of natural resource and coastal water management, land use planning of coastal zones, and maintenance and sustenance of fisheries. Still, many of these historically developed practices are under pressure due to the global challenges and rapid migration rates as well as insufficient awareness among development practitioners to use knowledge and experiences of local communities (Osore et al. 2022). Consequently, these run the risk of disappearing if they are not adequately captured, analysed and transferred to new generations. Similarly, bad practices that have been known not to work elsewhere can carefully be integrated into these coastal communities. There is therefore a need to develop and integrate new learning and knowledge transfer approaches and modalities which adequately integrate and mutually enhance both scientific / academic knowledge and community based and indigenous knowledge, and which rely on new insights of learning and education.

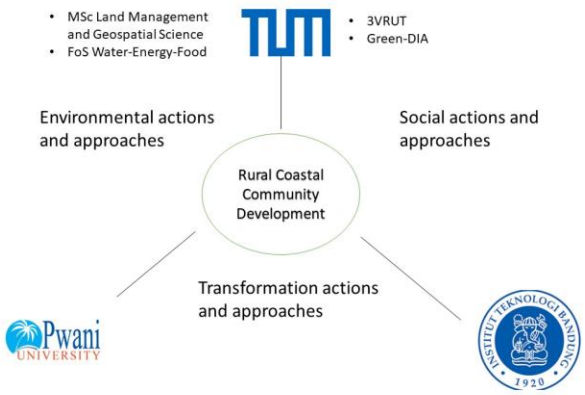
Project description

The project starts from the assumption that rural coastal development requires three types of SDG related actions and approaches which need to be aligned and integrated: (1) environmental, (2) social, and (3) transition actions and approaches. Currently these 3 knowledge fields are disconnected: educationally, scientifically and institutionally. This leads to monosectoral and incongruent policy choices and educational programs focusing on single problems and solutions. The environmental approaches should cater and consolidate knowledge on how to develop, protect and/or restore the land (and land rights) in coastal areas in alignment with needs and practices of coastal communities, and specific climate effects in coastal zones. The social actions should foster solutions whereby access to resources respects gender diversity, spatial equality and institutional transparency. The transition actions should transform the educational programs and approaches towards coastal community resilience, foster coastal community identities and enhance trans-disciplinary thinking.

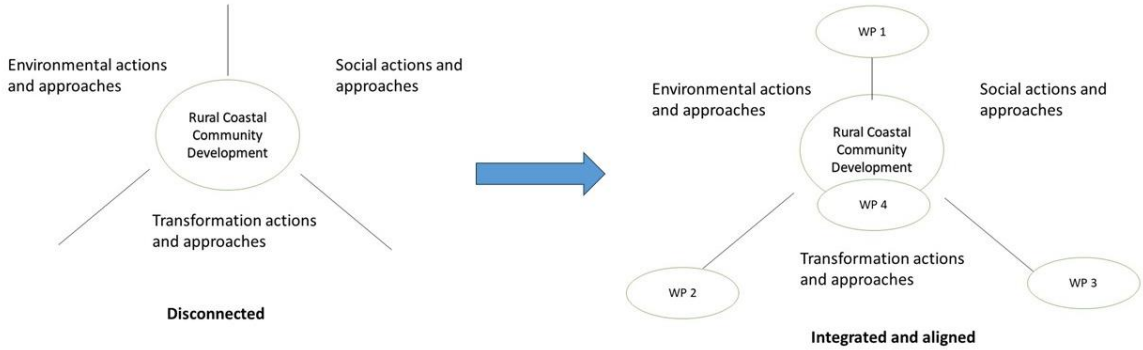


This project brings together three universities from three different countries/continents and scientific backgrounds: Technische Universität München (TUM) in Germany, Institut Teknologi Bandung (ITB) in Indonesia, and Pwani University in Kenya (PU). By leveraging

the strengths and expertise of these institutions and harvesting the potential that lies in the south-south connection, we aim to produce significant outputs in the fields of teaching, research, and university management as well as bridge existing knowledge gaps between academia and communities.



The project works with specific approaches to innovate trans-disciplinarity in coastal zone management. It aims to establish an international network that includes researchers specializing in coastal zones, rural land management and spatial development, as well as researchers and practitioners dedicated to learning, knowledge transfer, and extension methods. Furthermore, the network encompasses local coastal rural communities and community-development organisations with expertise in indigenous and community-based knowledge and management practices. The aim of this network is to capture and enhance existing knowledge transfer mechanisms and collaboratively develop new teaching, learning and knowledge transfer methods. These methods will integrate community-based knowledge with scientific insights and will be tested in various rural coastal areas with diverse coastal communities. To achieve these objectives, the project is structured into four working packages (WPs) of consolidate input / activities:



The approach of the activities working packages enhancing the partnerships follow the Javanese spirit of Guyub, which is a Model for Community Empowerment. "Guyub," which translates to togetherness or unity in English, is a core characteristic and identity

of the people of Yogyakarta, a region in Indonesia. In the spirit of Guyub, information exchange occurs swiftly, simply, and with a high sense of community. This communal approach begins at the smallest units, such as families and neighborhoods, and grows with solid support from society, enriched by the knowledge of academics and practitioners. Communities driven by the spirit of Guyub, form a "hub" or "melting pot" that fosters change and empowerment. This hub is characterized by rapid, simple, and highly communal information exchanges that start from the grassroots level. With the support of solid societal backing and the expertise of academics and practitioners, these communities become vibrant centers of innovation and empowerment and integrate local wisdom with global goals.

1. **Technical content of the project**

The project will establish an international partnership between educators, researchers and communities in and with an affinity with coastal zones, rural land management and spatial development. With the goal to enhance capacities in finding adequate solutions by joint collaboration between all partnerships, the project will develop:

1. New and enhanced educational modules at TUM, ITB and PU for their existing master programs
2. Staff exchange opportunities between TUM, ITB and PU
3. New knowledge sharing modalities between communities in Germany, Kenya and Indonesia and between academic staff members of TUM, ITB and PU
4. New science-community and science-citizen interfaces
5. Joint research colloquia, dialogues, conferences in Germany, Kenya and Indonesia
6. Joint academic publications between TUM, ITB and PU
7. New research practices involving non-academic actors
8. New academic management structures of south-to-south knowledge transfer and exchange and enhanced south-to-north and north-to-south management structures
9. New (knowledge) communication and dissemination modalities, with both coastal communities, women’s groups, fishery stakeholders, associations and coastal research institutes in Kenya and Indonesia

The above project deliverables will follow a logical progression from big to small. After an inception workshop with the main partners (TUM, ITB, PU) setting the main operational and strategic modalities for the partnership, the project conducts multilateral events in Kenya, Indonesia and Germany respectively, during which major research, education problems, requirements and goals relevant for rural coastal

management are derived and specific community projects are formulated. These events are followed up by specific community projects aimed at engaging with and for communities, capturing knowledge and practices and jointly researching effective solutions. Parallel to these activities, educational modules and teaching and knowledge transfer modalities at TUM, ITB and PU are tested and improved.

Project Objectives:

Concerning education, we aim to enhance teaching experiences through Collaborative Engagement, that is, by integrating and absorbing the expertise and perspectives of academia, practitioners, the community, and students. Our goal is to create a collaborative hub which enables sharing and exchanging insights in how and what to teach at TUM, ITB and PU.

Therefore, our targeted project outcomes are tailored to enhancing graduate training structures at partner institutions and include:

- Improved academic programs in environment, instructional technology, and blue economy at PU.
- Short strategic professional courses in blue economy and Community Service Learning at PU.
- Enhanced teaching module on SDGs within the Master Program in Land Administration at ITB.
- A newly developed non-degree Master Program in Land Administration at ITB, designed to offer flexibility in advanced education.

Further, the project outcomes align with the program goal of offering study programs related to relevant SDGs insofar that TUM, ITB and PU aim to offer study and qualification programmes related to the SDGs 4, 5, 10, 11, 13, 14, 15, 16, 17 in the context of climate change and its impact on coastal communities that are informed by the state of the art in the fields of Land Management and Geospatial Science (TUM), Land administration and Geodesy and Geomatics (ITB), Environmental Science, Curriculum Development and Education Technology (PU).

This means for ITB: A new introductory course on Geodesy and Geomatics Engineering at the bachelor level, focusing on its contribution to achieving SDGs.

- An improved teaching module in the Master Program in Land Administration to align with SDGs.
- A newly developed curricula tailored for managing local resources in coastal areas of Yogyakarta.
- For PU, this means enhanced academic programs in environment, instructional technology in education, and the blue economy.

These initiatives highlight ITB and PU's efforts to integrate sustainable development goals into their educational offerings, addressing specific regional challenges and advancing expertise in relevant fields.

In the field of research, we are planning to develop joint research output and visibility of research. This involves initiating research projects that address global challenges and resource sharing to support comprehensive and high-quality research. This can include laboratory equipment, research libraries, and specialized software, but also includes co-author research papers with all partners, increasing the impact and reach of the research through diverse and international dissemination channels.

The project objectives and outcomes related to research are aligned with integrating relevant research findings into their educational offerings:

- Academic offers include research results on climate change, community development, and knowledge transfer between academia and civil society in their courses and workshops.
- ITB has achieved to promote research findings aligned with SDGs at both the local and global and to integrate them into their teaching to address global and local sustainability challenges.

Further, the project objectives align with establishing global challenges, particularly climate change and its impact on coastal communities, as research priorities:

- TUM, ITB, and PU have establishes a shared research project on climate change's effects on coastal communities, focusing on communication, mitigation, adaptation strategies, and knowledge transfer.
- PU has conducted participatory action research on carbon credit mechanisms for mangrove blue carbon ecosystems, addressing climate change mitigation and biodiversity conservation.

These initiatives prioritize critical global topics and integrate research outcomes into educational frameworks across the participating institutions.

The project objectives support the program's goal of implementing effective knowledge distribution and transfer methods by promoting structured knowledge dissemination and enhancing community resilience to environmental challenges:

- Established systems to disseminate knowledge between universities and local communities, including indigenous groups, integrating academic and traditional/local knowledge effectively.
- ITB has developed mechanisms for transferring knowledge on SDGs within and across generations and communities, fostering integration between academic and public sectors.

- PU has established a knowledge base on community and fisherfolk resilience to coastal hazards, enhancing local understanding and preparedness.

Regarding the area of higher education management, our project fosters south-to-south, south-to-north and north-to-south collaborations, thus enhancing university management to absorb best practices exchange. This involves sharing and exchanging best practices among the partners in university management, including governance, strategic planning, and quality assurance, administrative training. Additionally, this should lead to innovation in management and innovative management solutions, such as the implementation of new technologies and processes that can improve efficiency and service delivery within the universities.

The project goals for higher education management follow the program's aim of strengthening organizational structures at partner institutions at the university management level:

- Enhanced service delivery within PU's university management, potentially through improved processes and resources.
- Enhanced organizational structures at ITB to facilitate effective knowledge transfer among academic, public, and community sectors.

Finally, the project goals are focused on integrating community engagement and civil society involvement into university management practices, aligning with the program's overarching objective of realizing the third mission in higher education:

- TUM, ITB, and PU have developed methods to involve civil society in university decision- making and activities, supporting the integration of the third mission in higher education.
- PU's newly developed strategy to enhance engagement with the community directly supports the goal of fostering meaningful interactions and collaborations beyond academia.

How the project supports SDGs

The partnership focuses on addressing the critical role of rural coastal communities in climate resilience and biodiversity conservation. Emphasizing Sustainable Development Goals (SDGs) such as Climate Action (SDG 13), Life Below Water (SDG 14), Life on Land (SDG 15), and well-being of indigenous peoples, the collaboration integrates education enhancement (SDG 4), gender equality (SDG 5), reduced inequalities (SDG 10), responsible community development (SDG 11), and partnerships for sustainable development (SDG 17). Each partner institution contributes uniquely: PU focuses on climate resilience and mangrove conservation, ITB integrates community and indigenous knowledge in education, and TUM addresses spatial justice and

sustainable land management. The partnership aims for a transdisciplinary and international approach, enhancing mutual learning across local and regional contexts.

Literature

Ballesteros, C., and L. S. Esteves. 2021. Integrated assessment of coastal exposure and social vulnerability to coastal hazards in East Africa. *Estuaries and Coasts* 44 (8):2056-2072.

Handoko, W., M. Soerjadjanegara, I. Irawati, and S. Suwarno. 2023. Enhancing Community Participation for Sustainable Coastal Empowerment: A Case Study of the Resilient Coastal Area Development Program in Central Java. *Research Horizon* 3 (4):378-390.

Jilani, W. J. 2016. Role of Indigenous Knowledge in Management of Marine Resources; Case Analysis of Kuruwitu and Mkunguni Fishing Villages in Kenya, Pwani University.

Kiss, B., F. Sekulova, K. Hörschelmann, C. F. Salk, W. Takahashi, and C. Wamsler. 2022. Citizen participation in the governance of nature-based solutions. *Environmental Policy and Governance* 32 (3):247-272.

Martinez, G. 2021. Coastal risk cultures: Local and regional formation of knowledge and action. *Frontiers in Environmental Science* 9:578238.

Muhtar, E. A., A. Abdillah, I. Widianingsih, and Q. M. Adikancana. 2023. Smart villages, rural development and community vulnerability in Indonesia: A bibliometric analysis. *Cogent Social Sciences* 9 (1):2219118.

Osore, M. K., F. A. Hassan, and G. N. Morara. 2022. Perceived benefits and barriers to community participation in development projects–The case of Hazina ya Maendeleo ya Pwani on the Kenya coast. *Western Indian Ocean Journal of Marine Science* 21 (1):35-49.