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The Second Terrace: Reconnecting with Water and the Vernacular in the Ifugao Rice Terraces

Leonardo Zuccaro Marchi, Shubham Majumder & Sara Sabry

Abstract
The traditional ecological knowledge (TEK) that is deeply embedded in the Ifugao Rice Terraces offers crucial insights for socio-ecological adaptation and resilience in times of climate change. It helps sustain local biodiversity and supports ecosystem processes while inspiring new design ideas that encourage an epistemological shift that involves integrating traditional knowledge with incremental innovations from the past into future solutions. The Second Terrace Lodge research-by-design project highlights the importance of the Ifugao community's local landscape and cultural heritage, illustrating how traditional water and land management can be integrated into contemporary architecture and landscape design.

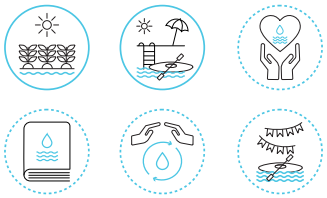
Policy Recommendations

- Use competitions as tools: Architectural competitions are key tools for supporting research and developing future transformation scenarios, especially in threatened landscapes like the Ifugao Rice Terraces (IRT) in the Philippines.
- Learn from TEK: Architects and stakeholders should learn from the traditional ecological knowledge (TEK) embodied in the IRT and other vernacular landscapes and reinterpret it in contemporary architecture.
- Balance technology and the vernacular: A wise balance between technological innovations and vernacular traditions is crucial, particularly for vulnerable areas.
- Learn from ancestral landscape farming landscapes like the IRT, shaped over thousands of years, which provide lessons in water, land, and heritage management that are useful for climate change adaptation in urban and landscape design.

KEYWORDS

Banaue
rice terrace
water systems
vernacular
landscape

WATER ICONS



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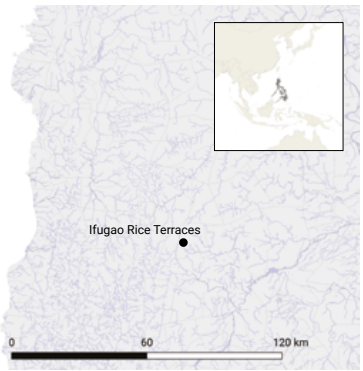


< Fig. 1 The Ifugao Rice Terraces (Source: Ericmontalban, 2012. CC BY-SA 3.0, via Wikimedia Commons).

Introduction

Mountain rice terracing is common throughout the Asia-Pacific region and is deeply connected to Indigenous cultures, traditional practices and the ecology of mountainous regions (Kawasaki 2012). However, climate change increasingly endangers these landscapes by worsening extreme weather events, such as heavy rainfall and disrupted water cycles. The iconic Ifugao Rice Terraces (IRT) in the Philippines, ancestral lands of the Indigenous Ifugao people – including groups like the Banaue, Bunhran and Mayayao – are particularly vulnerable.

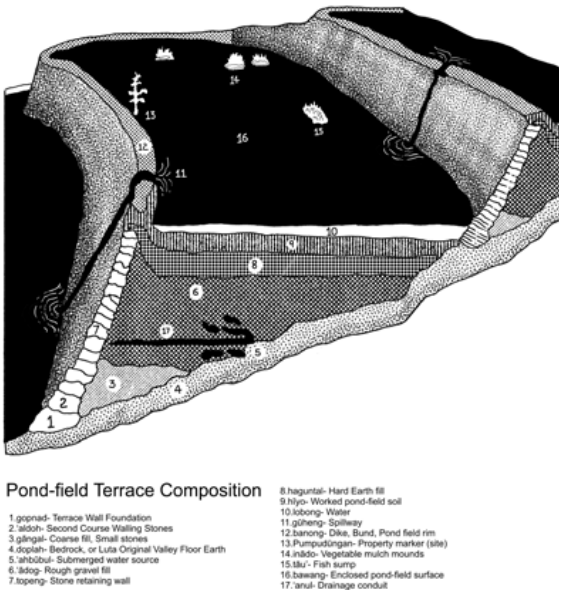
Learning from water and vernacular traditions offers hope and a strategy for rethinking our socio-spatial sustainable future. This article is based on a research-by-design project that won the 2024 Banaue Lodge competition (Zuccaro Marchi et al. 2024). Organized by TerraViva Competitions, the Banaue Lodge competition aimed to promote a new model of slow and sustainable tourism within the water landscape of the Rice Terraces of the Philippine Cordilleras in Banaue – a site designated as a UNESCO World Heritage property in 1995.

Competitions act as vessels of knowledge and opportunities for research and experimentation. This winning proposal relied on the dynamic nature of the IRT cultural landscape and its associated living heritage values to foster a more sustainable and respectful design approach. The project translated the local landscape's key elements and water heritage, developed over two millennia, into contemporary architecture. The typical section of the traditional Ifugao terrace, with its layering of different types of water and soil, became the main reference for designing tourism activities while also drawing lessons from its tectonics about sustainability, resilience and adaptation.

The project's main objectives were to translate the traditional Ifugao water systems into new spatial and architectural settlements that confront climate change threats, explore the role of architectural-landscape design in enhancing both cultural and ecological resilience, and promote sustainable tourism as a way to protect water-related Indigenous knowledge.

Water Systems and Their Role in Ifugao

The IRT are socio-ecological systems integrated into their natural environment and deeply connected to the local cultural heritage of rituals and agricultural knowledge. In 1995, the IRT property was designated as a UNESCO World Heritage site in recognition of its Outstanding Universal Value (OUV), serving as a dramatic testament to sustainable rice production, a memorial of the multigenerational history of labor and an example of harmonious cooperation between the environment and local inhabitants (UNESCO n.d.; SITMo 2008): "The Ifugao Rice Terraces epitomize the absolute blending of the physical, socio-cultural, economic, religious, and political environment." According to UNESCO, "the IRT is a living cultural landscape of unparalleled beauty" (UNESCO n.d.). The IRT property is also currently protected by the Indigenous Peoples' Rights Act of 1997 (IPRA), Republic Act No. 8371, a Philippine law that recognizes, defends and promotes the rights of local Indigenous cultural communities and their ancestral domains (SITMo 2008). Moreover, in 1973, the IRT had been declared one of the country's national cultural treasures by Presidential Decree No. 260, issued by then-president Ferdinand Marcos (UNESCO n.d.; SITMo 2008). The decree's primary purpose was to develop and preserve the site, promoting cultural and national identity and propelling new forms of tourism. In addition to local and in-



^ Fig. 2 Pond field terrace composition adapted and redrawn by the authors from Harold Conklin's (1980) Ethnographic Atlas of the Ifugao (Source: Leonardo Zuccaro Marchi, Shubham Majumder and Sara Sabry, 2024).

ternational laws and decrees, the terraces are protected through traditional practices within a cooperative approach involving the entire Indigenous Ifugao community and related ancestral rights and tribal laws (UNESCO n.d.).

Renowned for their expertise in sustainable ecosystem management, the Ifugao communities live at elevations between 800–1,500 m, carefully preserving forests and cultivating terraces in harmony with nature (fig.1). According to UNESCO, their living cultural landscape began to take shape in what is now the Philippines over 2,000 years ago (UNESCO n.d.), although more recent studies date their development to 1500–1600 AD (Acabado 2009). The terraces rely on the Muyong forest system, a community-managed hydrological system located at the top of the mountains that conserves water and protects the terraces (Jang and Salcedo 2013). The Muyong hosts a wide variety of fauna and flora, serving as the primary recharge zone and providing a stable nutrient-rich water supply to other parts of the production system (Camacho et al. 2012; 2016; Negro 2019). Some upstream runoff is directed into the terraces, while the rest is diverted to villages for daily water use (Herath et al. 2015). Water is sourced from streams and rivers, channeled through bamboo and log flumes into an intricate irrigation system. This setup supports rice farming as well as aquaculture, where species such as fish and edible mollusks thrive, thereby enriching the region's biodiversity. Communities historically developed the IRT by using natural water flows and interconnected irrigation channels to optimize water efficiency while preventing runoff and soil erosion. In Ifugao, the concept of "water districts" organizes agricultural leaders and workgroups to construct and maintain irrigation channels, which gradually release water into terraced paddies, ensuring consistent moisture levels for rice cultivation (Herath et al. 2015).

The Ifugao's soil and water conservation technology uses irrigation and bench terracing methods developed by their ancestors over many centuries. The steep terrain was smartly transformed into a series of horizontal platforms or "benches," with retaining walls and embankments that slowed water flow, allowing it to seep into the soil instead of rushing down. The paddies "act as mud and sand-traps" (SITMo 2008). Terrace ponds collect water, sealing cracks that might cause landslides. This preserves humus-rich soil and reduces siltation by trapping mud and sand. Moreover, the antique practice of planting camotes (sweet potatoes) on steep, unirrigated slopes limits erosion. Grass between crops stabilizes soil, preventing collapse (SITMo 2008). This method is an example of ancient mastery over natural forces and the environment, demonstrating a balanced harmony with nature and wise

management of local resources from which architects and stakeholders should learn.

The cross-section of a typical Ifugao pond field (fig. 2), redrawn from Harold Conklin's (1980) *Ethnographic Atlas of Ifugao*, exhibits the complex stratifications of retaining foundation walls, coarse gravel-earth fills and water systems from the submerged water source to water basins and spillway, to drainage conduits. The terraces and water systems are closely connected, with water carefully managed to support farming. Originally built as survival tools to cope with environmental challenges, these systems showcase Indigenous expertise in soil, water behavior and weather patterns. Over time, they have become cultural symbols of resilience, embodying the harmonious relationship between nature and community. According to researchers, the Ifugao water system is a model that can be replicated in other areas around the world with a shortage of water supply due to drastic climate and environmental changes (Jang and Salcedo 2013).

This ecological system and complex farm activities are inseparably linked with the local inhabitants' sacred collective rituals, chants, symbols and taboos in a way that nurtures bountiful yields (SITMo 2008; Negro 2019). The socio-ecological system of the IRT closely mirrors Indigenous knowledge of spiritually and productively connected practices developed over thousands of years of direct human interaction with the habitat (Camacho 2012).

Challenges

Recent pressures, such as climate change, tourism and changing agricultural practices, have disrupted traditional methods. The Sixth Assessment Report (AR6) of the United Nations (UN) Intergovernmental Panel on Climate Change (UN, IPCC 2022) highlights the increasing and serious impacts of climate change on the Philippines, including higher temperatures, altered rainfall patterns and more frequent extreme weather events, all of which threaten IRT and the communities relying on them.

Soil and cultural erosion: Climate change is introducing new risks, making terraces more susceptible to water shortages and droughts during dry seasons. As watersheds are disturbed, water flow to the rice terraces decreases, causing erosion in rice fields that struggle to be properly irrigated. This leads to further erosion and silt buildup, contaminating the rivers, a situation made worse by inadequate sewage systems in Banaue and neighboring areas (SITMo 2008).

Tellingly, the loss of the terraced landscape occurs in parallel with the "erosion of Ifugao cultural and spiritual heritage" (Herath et al. 2015). The threat is the loss and disappearance of traditional yearly farming practices, which were cyclically conducted by agricultural priests, and ancient rituals calling for abundant harvests. These ceremonies were woven into the landscape as a cultural layer over the stratifications of soil, vegetation and water that form the terraces. This cultural loss is linked to migration. Members of younger generations often migrate for better opportunities, contributing to a decline in traditional knowledge, including of Ifugao mythology (De Leon et al. 2021). This results in the abandonment of the terraces.

Tourism: Tourism provides economic alternatives that sometimes overshadow farming, raising challenging questions about preserving local identity, cultural heritage and environmental settings. Tourism in the area can be

traced back to the mid-1700s and it has continued ever since, gaining momentum in the mid-1970s after the Presidential Decree (SITMo 2008). Today, it exists in a delicate balance between commercialism and conservation (Dulnuan 2014). Once a pristine valley carved by rice terraces, in recent decades the IRT have faced threats from unchecked residential, commercial and tourism development, leading to noise, pollution and congestion that affects water resources and soil health. The Indigenous forestry and natural regeneration system of the Muyong community is at risk of being lost, causing territory erosion. Meanwhile, increasing demand for carved wooden souvenirs has accelerated deforestation. Since the forests provide essential watershed functions and a constant supply of nutrient-rich water for the rice terraces, deforestation has caused irrigation problems, leading many terraces to be abandoned (SITMo 2008; Negro 2019). In 2001, the IRT was placed on the World Heritage in Danger list "in recognition of the human-induced threats" and the urgency of short- and long-term protective actions (IUCN 2002; SITMo 2008).

Despite these threats, Ifugao communities continue adapting to new challenges from tourism and climate change by implementing policies that promote reforestation, sustainable forestry and community-led irrigation management, ensuring the lasting legacy of their agricultural heritage. To safeguard these systems, local authorities have worked to integrate contemporary strategies with traditional knowledge and new adaptive practices (Droogers 2004). Programs and plans, such as the CBLUZP—Community-Based Land Use and Zoning Plans – have been developed to document the site, uphold integrity conditions, reduce cultural degeneration and rehabilitate lost traditional practices (UNESCO n.d.).

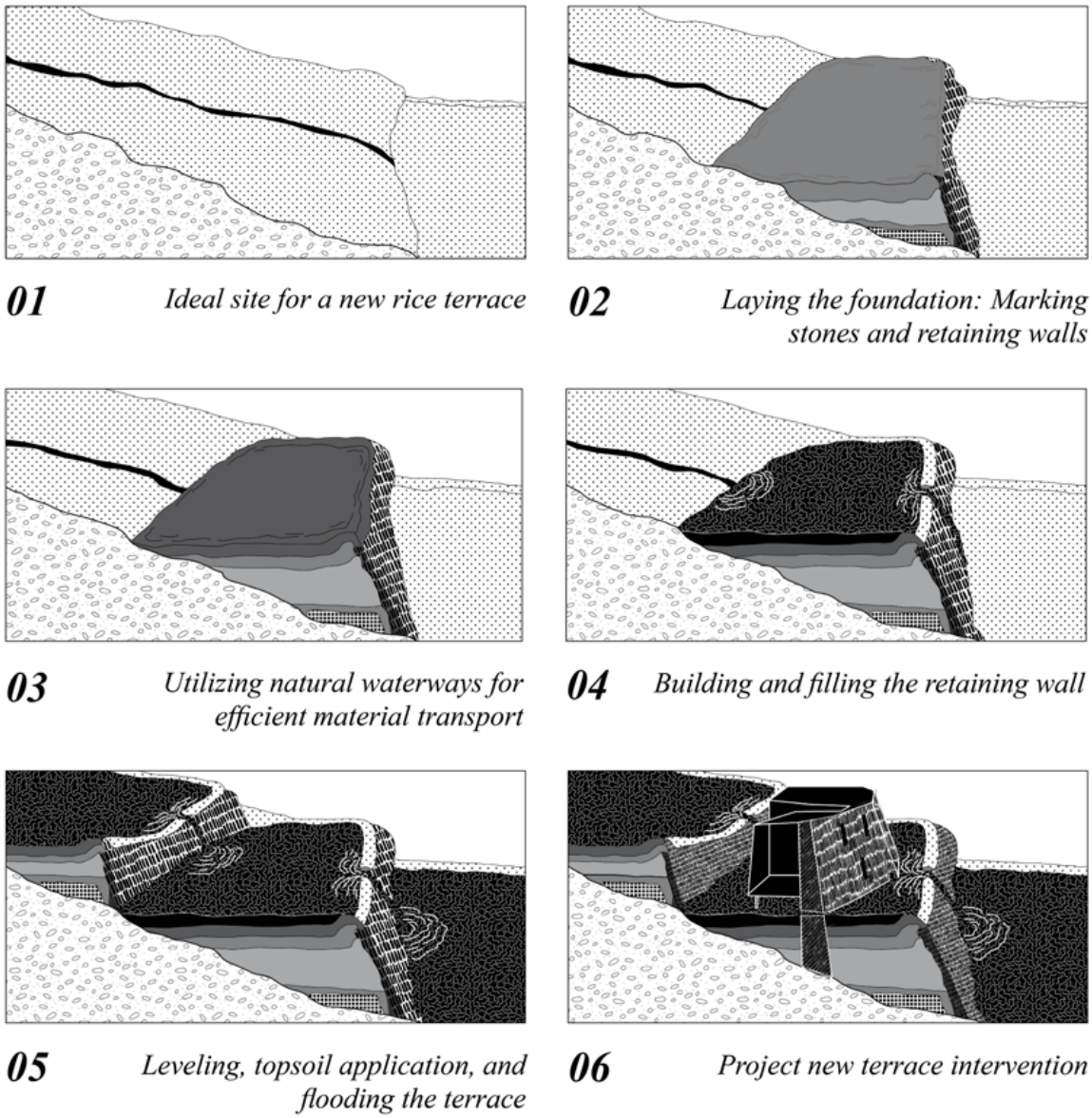
While tourists are attracted by local Indigenous culture, Indigenous communities, in turn, depend on sustainable tourism for protection and conservation (Dulnuan 2014). This interdependence helps reinforce and pass down vernacular traditions, rituals, and water and land management practices. This fragile connection between a new sustainable form of tourism and local traditions became the guiding reference for our project proposal.

Water and Vernacular: The Second Terrace Lodge Project

The Second Terrace Lodge project emphasizes the local land and water heritage of the Ifugao Community as a vital and functional inspiration for contemporary architecture and landscape design. The project holds that the traditional ecological knowledge (TEK) embodied in the IRT offers valuable insights for socio-ecological adaptation and resilience, contributing to the sustainability of biodiversity and ecosystem processes and inspiring future designs.

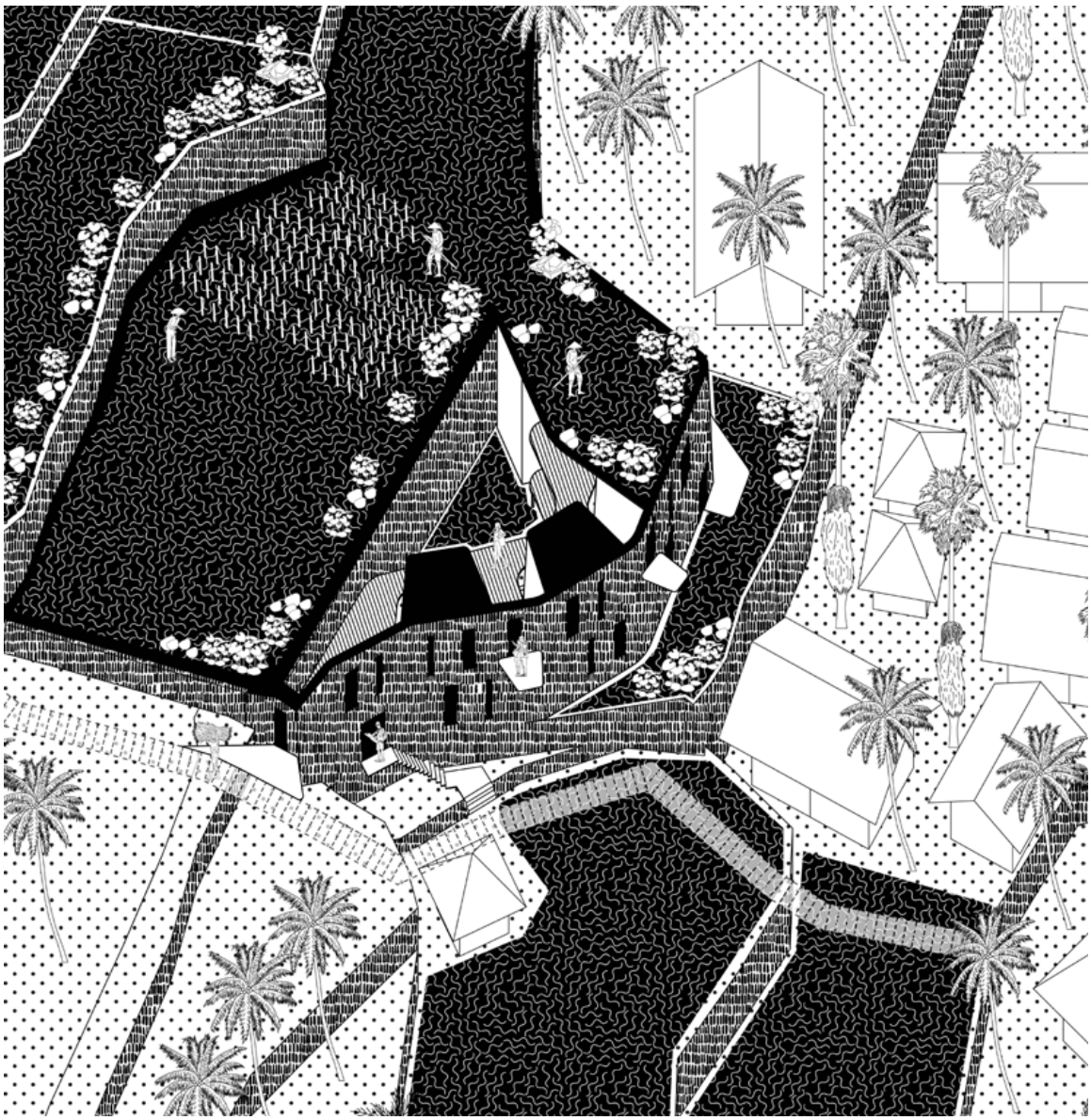
In the last two decades, several researchers have highlighted the necessity to reestablish equilibrium and synergy between the "mythology of technology" and vernacular "Indigenous innovation" (Gómez-Baggethun et al. 2013; Watson 2020; Piesik 2023). The IRT provided an opportunity to evaluate this equipoise. Indeed, the project reiterates the wise vernacular legacy embedded in the territory, becoming part of the historical terraced landscape while fostering a new, contemporary connection between people and nature.

The project grows out of the community's local landscape and vernacular activities without being disruptive or alienating. As shown in the phasing diagram (fig. 3), it is designed



^ Fig. 3 From rice terraces to Second Terrace Lodge (Source: Leonardo Zuccaro Marchi, Shubham Majumder and Sara Sabry, 2024).

to be integrated into the terraces' construction process, following local traditions of stone retaining walls, topsoil application and natural flow of waterways. The project encourages new, sustainable forms of social interaction between visitors and local inhabitants, preserving rice-cultivation culture while incorporating it into a new model of tourism education (Dulnuan 2014). Hosts are actively engaged in local rites and cultivation, living alongside and learning from the community rather than observing it from a distance.



^ Fig. 4 Axonometric drawing of the Second Terrace Lodge (Source: Leonardo Zuccaro Marchi, Shubham Majumder, and Sara Sabry, 2024).

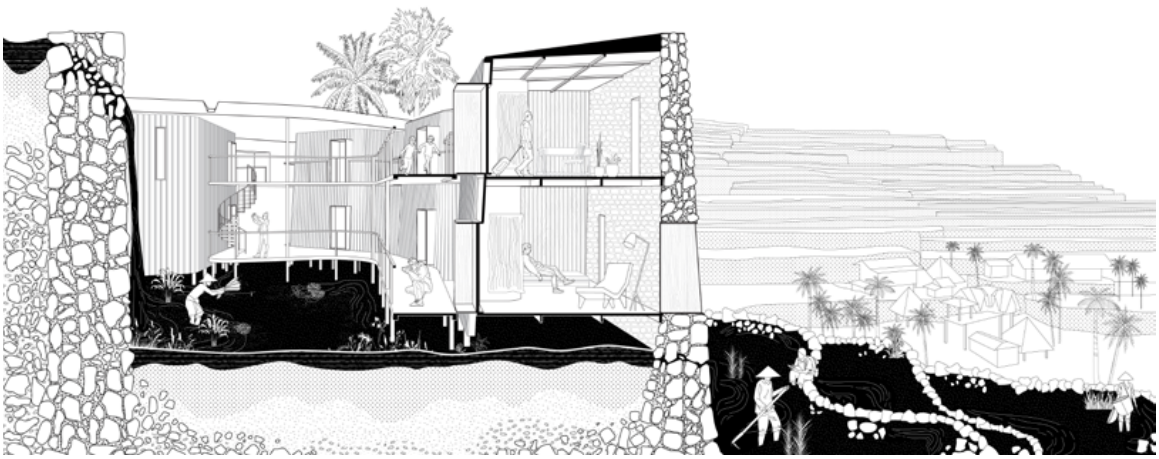
The "second terrace" proposes an additional cultural and economic opportunity to integrate the landscape's cultural heritage and local identity with a responsible, respectful form of tourism and hospitality. The area's existing hotels are modern structures built for mass tourism, rising prominently from the ground and seeking harmony with the topography and nature, like the Banaue Hotel & Youth Hostel. This modern building was constructed in 1970 with a capacity of about 500 people and is managed by the Department of Tourism (Baldo et al. 2017).

^ Fig. 5 View from above, approaching the Second Terrace Lodge (Source: Leonardo Zuccaro Marchi, Shubham Majumder and Sara Sabry, 2024).

Other tourist structures were built without adherence to building or construction codes, resulting in unfinished structures and temporary shanties that have marred the landscape (Dulnuan 2014). In contrast, the new lodge is intended for small-scale tourism and is camouflaged within the existing fabric, blending into the tectonics of the terraces, where agricultural-religious rituals and chants continue undisturbed (fig. 4).

Visitors are housed inside an emptied and inhabited new terrace, which is integrated into the intricate irrigation system of streams and basins that harvest water from the forests of the mountain above. If local people call themselves "*Ipugo*", meaning "from the earth" (SITMo 2008), the new visitors are also part of this cultural ground, in direct contact with the anthropological and natural essence of the place. The new hospitality architecture features a hollow space inside the ground, using the same stone wall that supports soil, water and gravel layers on the other full terraces. The rigid external wall contrasts with a more internal softscape of wood, water, and herb cultivation. Whereas the external wall adopts the same stone and mud materials as the other terraces' facades to obtain a mimetic effect, the internal volumes are wooden-made, inspired by the "*bahay kubo*", a type of stilted Indigenous house in the Philippines. The project includes three volumes with two floors, housing seven apartments – six single units and one for families – connected by a main retaining wall that extends from the terrace wall above. The existing path, which runs along the entire terraced hill, links the ground and first floors of the project, allowing the new structure to integrate smoothly with the existing paths and practices (fig. 5).

Water plays a primary role in reconnecting nature and community. The new terrace frames an internal courtyard, where water flows from the terrace above and continues to spill into the terrace below without disrupting the existing ecosystem. The new terrace's wall is porous, preserving and maintaining the existing water distribution channels that feed the terrace paddies (fig. 6). The water court, filled with local plants and crops, serves as a relaxing space for meditation and social interaction. It affirms the human-natural connection with the site, also becoming a place for meditation and relaxation for visitors (fig. 7). The inner courtyard is used for growing the local native rice variety, "*tinawon*" rice, meaning "once-a-year" rice (SITMo 2008), enhancing contextual sensitivity inside



^ Fig. 6 Perspective section of the Second Terrace Lodge (Source: Leonardo Zuccaro Marchi, Shubham Majumder and Sara Sabry, 2024).

^ Fig. 7 View inside the introverted water courtyard of the Second Terrace Lodge (Source: Leonardo Zuccaro Marchi, Shubham Majumder, Sara Sabry, 2024).

the lodge. The rest of the terrace is used for other local crops and an assortment of vegetables and decaying plant material during the rice cycle's fallow season ("*pingkol*" practice), such as rice stalks, floating fern ("*Azolla pinnata*"), rice field water weed ("*Najas graminea*"), water hyacinths, duckweed and other leafy succulent plants (SITMo 2008). The main building's roof also functions as a water reservoir, connected to the agricultural activities of the rice field above.

Finally, the visitors at the lodge will respect, learn about, and participate in the agricultural cycle rituals, the "*Hongan di Page*", which residents perform during the annual agricultural cycle to honor gods and other unseen beings in order to ensure healthy and robust rice crops (SITMo 2008). As highlighted by UNESCO, these ritual practices, chants, and symbols emphasize the ecological balance that the IRT has sustained over 2000 years, combining and addressing various and mutable ecological, agronomic, ethnographic, religious, social, economic, and political factors (UNESCO n.d.).

Coda: Hopes for Water Design

Blending contemporary architecture with vernacular landscape elements presents a new challenge for architectural practice, especially in adapting to severe climate change. The Second Terrace Lodge encourages a respectful, innovative approach to achieving proper synergy with natural elements and local communities, emphasizing an anthropological and ecological perspective of responsibility. It promotes harmonious intervention while maintaining and reinterpreting the place's socio-spatial authenticity, along with tourism that educates visitors about local rituals and practices. The Ifugao community's water–ground legacy is a "living cultural landscape" (UNESCO n.d.) that inspires future architectural and urban challenges, sparking new design ideas that explore an epistemological shift toward traditional knowledge in harmony with incremental innovations.

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We appreciate the initiative of the competition organizers, who focused on a relevant topic and an incredible site. Unfortunately, we were not able to visit the IRT before this competition and research. Although we acknowledge this as a limitation, we can still claim to have developed a successful competition project and written this article taking as honest an approach as possible for the site and its residents. We hope this article will open opportunities to visit the IRT and support further development of the project. Finally, many thanks to all the editors of *Blue Papers* for their helpful comments and reviews.

This contribution was peer-reviewed. It was edited by members of the editorial team of the UNESCO Chair Water, Ports and Historic Cities: Zuzanna Sliwinska, Matteo D'Agostino and Carola Hein.

Useful links
https://www.leonardozuccaromarchi.com/
https://www.leonardozuccaromarchi.com/banaue-lodge/

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Leonardo Zuccaro Marchi is an architect and assistant professor (ricercatore RTT) at Politecnico di Milano, working on the Floating Habitat research project. He received his PhD at IUAV and TU Delft Universities as a Joint Doctorate with research on *The Heart of the City* (published by Routledge in 2018). He was a postdoc at KTH Stockholm, a visiting lecturer at TU Delft, and a guest researcher at ETH Zurich, TU Delft and UNSW Sydney. He has won the Europan competition and several other architectural awards. He is a cofounder of CoPE.

Contact: leonardo.zuccaro@polimi.it & https://www.leonardozuccaromarchi.com/

Shubham Majumder is an architect from India, who has worked since the completion of his bachelor's studies on urban and peri-urban morphologies, with a focus on waterfront urbanism in Mumbai. He continued exploring this topic while completing a master's degree at Politecnico di Milano, where he recently graduated with a thesis titled "Living with Water," focusing on resilient urban paradigms adapting to rising seas.

Contact: shubhammajumder.work@gmail.com

Sara Sabry is an architect and urbanist from Cairo, Egypt, with a degree in architecture engineering. She is pursuing a master's degree at Politecnico di Milano, focusing on architecture, urbanism and geopolitical boundaries.

Contact: saraahmed.sabry@mail.polimi.it