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Key to life that bound spirit, humans and Nature since ancient rice farming began – Bali’s treasured Hindu water systems, World Heritage landscapes – and sustainability of the island, is now under serious threat.

“Regarded as the ultimate origin of every spring and river” is Bali’s largest volcanic caldera, Lake Batur – a major freshwater catchment and home to Pura Ulun Danu, a holy water temple dedicated to the Goddess of the Lake, at the foot of Mount Batur. Dropped to unsustainable levels, the sacred waters are now polluted by toxic

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agricultural chemicals and illegal trash disposal.

Listed for World Heritage values in 2012, the United Nations Education, Science & Cultural Organisation (UNESCO) also identified vulnerability factors for urgent attention: lack of governance in landscape conservation “to protect the water source that underpins the subak system”, development pressures and lack of support for farmers of the the unique 10th century traditions.

Three hundred of Bali’s 400 rivers are drying up island wide. Of 162 democratically shared waterways that sustained thousands of rice farming villages, and 3500 holy subak canals, major rivers are now diverted to supply crowded tourism precincts at beachside resorts in the island’s south.

Water wars

In stark contrast to tourism imagery, ‘sawah’ rice fields across Bali lay parched and no longer fit for productive farming, producing a single harvest a year where two or three annual crops were once normal. Sawahs near luxury resorts appear evergreen, a landscape for tourists only. A visit to UNESCO-listed rice fields reveals eroded, unkempt terraces, and swarms of tourists, arriving by busloads on Bali’s traffic-choked narrow roads.

Due for review in late 2016, Bali’s ‘State of Conservation’ is still of concern, citing ‘lack of action toward urgent improvement in water catchment quality, forestry conservation management and planning to control growth in mass tourism’, as recommended to maintain ‘Outstanding Universal Values’, according to UNESCO records.

An alarming and inconvenient truth, Bali’s water crisis is now in local headlines every other week, and recently by global media in *The Conversation* and *Sydney Morning Herald*. Regular reports by news agencies such as Aljazeera, SBS and ABC Australia of Bali’s water, trash and relentless development woes have made headlines since 2008 when researchers warned of water crisis from unsustainable consumption.

[Alila Villas Uluwatu](#)

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A 2012 report by *The Guardian* highlighted global water impacts in mass tourism destinations Bali, Goa – and exotic Zanzibar Island, where security patrols protect hotel borders from local communities who no longer have access to fresh water.

Business as usual?

Bali tourism earns billions of dollars a year for investors and national treasury. According to Tourism Minister Arief Yahya, Indonesia earns US\$10 billion a year from tourism – Bali contributes 40%, or US\$4 billion a year, quoted *Bali Discovery* in a recent report.

Domestic arrivals to Bali province totalled over 7 million Indonesian tourists in 2015, with a total of 12 million visitors statistical trends indicate a 20% annual increase. Australia is the highest overseas source country of 23% of international visitors to Bali, followed by 20% from China. (Source: Bali Government Tourism Office)

Bali's local population of approximately 4 million permanent residents, whose regional households regularly run dry with minimal access to fresh water at times, faces increasing drought conditions.

“Water shortages intensified in 2015, with Bangli and Buleleng regencies severely affected by drought. Other areas, like Kuta have seen water sources down by 20 to 25%”, according to Horwath HTL Indonesia's 2015 Bali Hotel and Branded Residences annual investment review, that reports an additional ‘115 major hotel resort properties will open by 2019’.

Endless tourism cargo forever changed Balinese culture and landscapes. Mixed generations now live in three worlds juggling local customs, demands of central government and the relentless appetite of globalisation that has created mass wealth for a lucky few – but many Balinese are left behind in silent poverty, vulnerable to illness and disease.

United Nations Sustainability Goal Number 6 aims for sustainable water supplies for all by 2030 – but with a tourism dependent economy, Bali’s worsening water crisis is still the “elephant in the room” for regional planning.

‘While demand is projected to grow by 30-40%, existing water resources can be considered already fully utilised due to rapid groundwater depletion,’ reports Asia Water Development Outlook 2016, a regional countries report by Asia Development Bank (ADB) that reveals low scores for Indonesia’s water security, well behind tourism rivals Malaysia and Thailand in resilience to drought, climate change and natural disasters.

“Business as usual is not possible anymore,” said the ADB Asia review.

We have a solution

On Bali, water crisis research and program management alliance of Politeknik Negeri Bali (PNB) University, IDEP Foundation and team of probono experts, are fine tuning the scientifically proven Managed Aquifer Recharge (MAR) system for local conditions as a blueprint for Bali Water Protection (BWP) program, reported in 2015 by Bali Advertiser, to rapidly recharge critically diminished water tables.

Proven economically efficient by global case studies, PNB hydrologists installed six test pilot recharge wells in Denpasar, in cooperation with city authorities, toward the BWP program construction of 136 recharge wells – each 3m x 3m – in nine hotspot crisis areas across Bali province, including Nusa Penida islands group – all critically threatened by irreversible salt water intrusion.

A result of deep groundwater over-extraction that supplied decades of rapid tourism growth and commercial water sales in excess to agriculture, Bali is fast exceeding the tipping point of the island’s carrying capacity and, according to BWP manager’s, time is running out to enact a rapid water management solution to avoid future damage and catastrophe.

Benchmark water management

A leader in water resilience science, Australia's national water management program is focused on the Managed Aquifer Recharge (MAR) and water recycling systems as benchmark development solutions for public, industry and agricultural landscapes. A 2015 assessment of six pilot sites reported "most are economically viable, with favourable benefits to cost ratios, often due to avoided costs compared with above ground storage, wastewater treatment, or other water options".

A multiagency alliance led by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), state governments, universities and other partners – "managed aquifer recharge could help water utilities, government agencies and the community" to:

- Increase the resilience of water supplies
- Provide water in seasons of high demand
- Replenish exploited aquifers
- Prevent salt water intrusion
- Protect groundwater dependent ecosystems.

(Source: Australian Water Recycling Centre of Excellence, 2016)

India implemented the MAR system in 1997, recharging deep aquifers in drought-stricken regions with initial funding of US\$400 million for state programs. Afghanistan now operates a government-supported MAR program, with grant support from Asia Development Bank.

Save Bali water

Endorsed by the Provincial Governor in 2015, the Bali Water Protection (BWP) program has received no government funding or corporate support for shared responsibility in constructing the best practice managed aquifer recharge systems, designed for rapid restoration of deep aquifer water levels and long-term benefits.

However, a recharge effort to install narrow pipes to a depth of one metre was launched in 2016 by provincial government: 'All schools and government units are being told to install biopore holes at schools and villages'.

Increasing environmental disaster, with high economic risk from worsening water crisis impacts, has driven BWP program managers to public crowdfunding – in attempt to raise a total of US\$1 million required to construct an effective MAR system across Bali province and mitigate this natural resource challenge – a 'Tragedy of the Commons'.

Correct well site selection and quality control maintenance is critical to effective rapid aquifer restoration. A minimum of US\$100 000 will allow the recharge program to begin technical stages – BWP reports that 15% of minimal funds have been raised since launching the campaign in mid-2015.

Most contributions to the BWP crowdfunding campaign, reports communications manager Julien Goalabré, are from overseas donors. "Mostly foreign residents based on Bali, small local business such as BWP Pioneer Sponsor Bali Bunda [formerly Bali Buda] – and CSR supporters who visit but don't live on the island, like New Zealand web domain company – iwantmyname -and VitaliTymoves yoga retreats from Australia".

In support of BWP campaign, Michelle Redman of VitaliTymoves explains how visiting retreat students are required to raise money to give back to the community. "I will be encouraging visitors in Bali to think about contributing to the water and environment issues while they visit," she said.

Time to act is now

Bali Water Protection program has received minimal interest from Bali hotel owners but local media publishers, such as Bali Advertiser, Bali Go Live, Now! Bali and 42 Gurus are generously supporting promotion of this MAR solution to benefit all of Bali, according to IDEP Foundation Chief Executive, Ade Andreawan.

“Ultimately, it is time for all Balinese citizens, visitors, and profiteers to own responsibility for this Bali water crisis – whether individual locals or corporate groups, all with a stake in sustainability for the long-term future of our water – time is running out, we need to work together on solutions,” he said.

“In the end protecting water just is, our inherent responsibility,” said Brenda Richmond, a major supporter of BWP and Founding Director Bali Bunda.

To learn more about the BWP program, visit www.idepfoundation.org/en/bwp

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