Revitalizing Traditional Knowledge and Bio-Cultural Heritage in North East India

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1. Introduction

North East India represents an eclectic mix of cultures, beliefs and practices, which have remained unchanged for centuries and demonstrate a deep understanding of the natural environment and its contribution to a society's survival and well-being. As a culture, which is rapidly transforming and integrating with the mainstream, it presents a unique context for studying ancient practices and developing ingenious solutions, which are relevant for the current context. Merging traditional knowledge with contemporary cultural and technological patterns, and applying resultant hybrid solutions through rigorous field tests is proposed as the underlying strategy for revitalizing traditional knowledge and bio-cultural heritage. A three-pronged approach focussed on combining 1) conservation, 2) scientific research and development, and 3) grass root entrepreneurship is proposed as the method. By integrating different viewpoints and developing solutions through a participatory and immersive process, the author proposes an interdisciplinary approach, which is focussed on addressing critical local concerns. This will eventually lead to novel solutions, which are suitable for different sections of society thereby ensuring long-term sustainability and resilience.

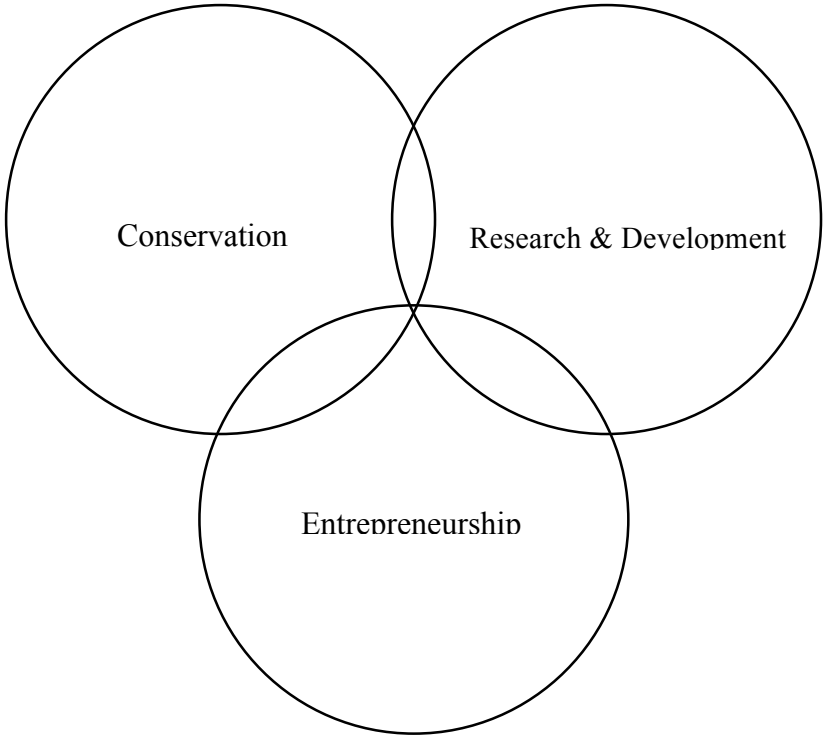


Fig. 1: Pillars for revitalizing traditional knowledge and bio-cultural heritage

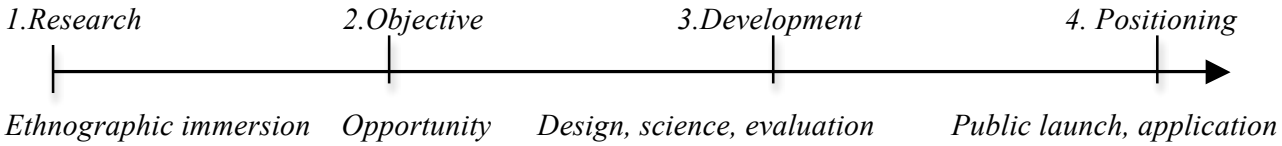
2. Heritage revitalization

2.1 Conservation

Preservation, protection or restoration is the first step in a sequence of successive measures required for working with traditional knowledge and bio-cultural heritage. This nurtures a reference for all subsequent action related to improving and replicating the knowledge or ecosystem. In the context of North East India this stage assumes critical importance owing to rapid changes occurring across all domains of the society and its impact on indigenous knowledge systems and natural resources. With specific reference to cultural heritage and ecology related practices, conservation assumes high priority owing to the inherent nature of these systems. Once lost or damaged, remediating and restoring such systems to their original performance is a challenge.

2.2 Research based innovation and grass root entrepreneurship

Working with traditional knowledge and bio-cultural heritage requires a precise understanding and assessment of the overall context. Well-informed immersive research of all interconnected parts has the potential to alter the way we 'see' and 'value' an ecosystem, a process or a technology, and develop effective solutions, which lead to all round development. The investigating team must strive to find a critical balance between the 'old' and the 'new', and celebrate aspects, which demonstrate potential, and in turn sacrifice other aspects, which do not contribute to the overall performance or service. It is essential to work with a sense of innovation and experimentation to develop solutions, which respond to current needs and realities of the society. This will lead to new identities, which will revitalize the knowledge system and provide a fertile ground for the next generation. These hybrid identities will perform as catalysts, which are essential for the growth of a system. In order to respond to contemporary concerns and opportunities, and to apply traditional knowledge and skills, the local communities must develop a sense of openness and spirit of innovation. This is especially relevant in North East India, which has exemplary ancient knowledge systems and practices. The author would like to highlight four case studies, which have explored a balance between conservation and research-based innovation within an entrepreneurial framework. Ranging in scale and impact, these examples have been chosen to demonstrate the potential of working with traditional knowledge in difference contexts. A four stage iterative process informed by feedback was followed in all the case studies as listed below:



The first case study demonstrates the revitalization of traditional hand-woven Kolhapuri leather footwear by systematic and deliberate combination of handcraft with machine craft for a new bi-cultural product category. The hybrid product language combined semantic and syntactic elements from contemporary sports footwear with traditional Kolhapuri chappals for the contemporary user. The project developed through collaboration between Toehold Artisans Collaborative in Athani and Indian Institute of Technology Mumbai[1]. Research involved addressing concerns related to natural resource management, product ergonomics, customization and customer experience. Current annual turnover of the 400-family Toehold Artisans Collaborative is $1 million with significant socio-economic impact[2] (Fig 4). The second case study demonstrates revitalization of natural fiber weaving through the launch of a new range of woven artefacts, which focused on natural dye finishes and alternate natural materials. Design strategies related to standardisation, manufacturing efficiency, improved packaging and contemporary product morphology contributed to overall product performance[3]. The project developed through collaboration between Cane Concepts Dimapur and Indian Institute of Technology Mumbai (Fig 5). The third case study demonstrates a new building façade technology using pressed bamboo board and pre cast reinforced cement concrete components. The low cost tropical building technology has optimized the performance of pressed bamboo through improved morphology, manufacturing process and systems approach. The project was developed in collaboration with Flying Elephant Studio in Bangalore and focused on modularity, affordability, structural robustness, component-based design and low carbon footprint. The design is currently undergoing field tests and will eventually be launched in the market (Fig 6). The fourth case study demonstrates development of a novel earthquake resistant timber structural system inspired by basket weaving methods of North East India and traditional snake-boat (or palliyodam) construction of Kerala[4]. As a component based deployable system, the solution is scalable, replicable, and can be manufactured and assembled by local communities. The research and development focused on understanding the role of friction in basket weaving, and developing an improved interlocking scarf joint system, which can withstand earthquakes. In addition, timber grid shells informed the overall assembly and fabrication method. Rigorous scientific testing of the

structure was carried out to validate and improve the performance through a full-scale test bed (Fig 7). The woven structural system is now available for implementation.

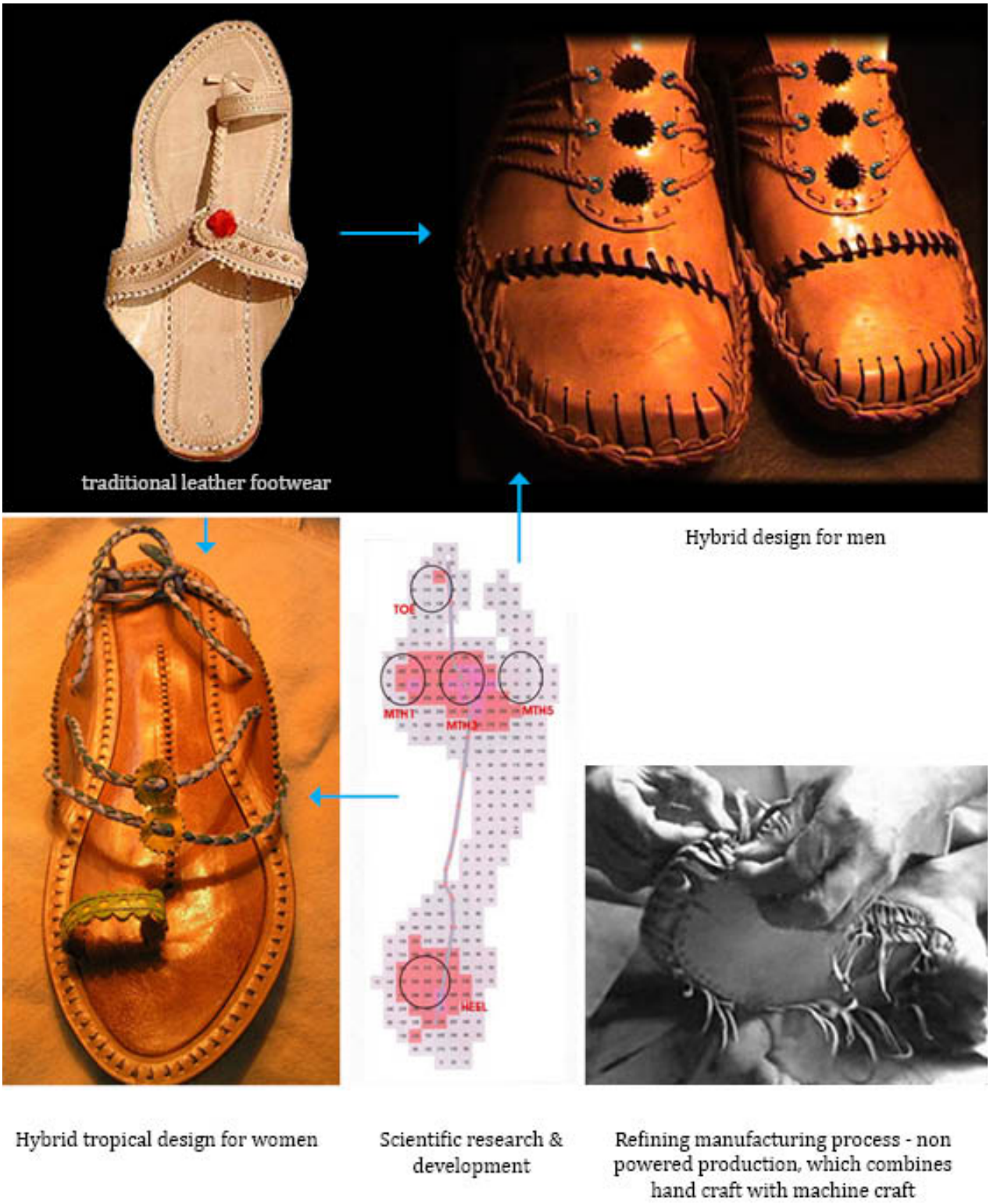


Fig 4: Bi-cultural hand made leather footwear, Athani and Mumbai, 2005

Toehold Artisans Collaborative, Annual turnover $1 million. This hybrid product category assimilated elements from contemporary sports footwear and traditional hand-woven Kolhapuri leather slippers from India. The product and material language systematically merged handcraft with machine craft to respond to customer needs and aspirations. This case study demonstrates a successful combination of conservation, research based innovation, and local entrepreneurship.

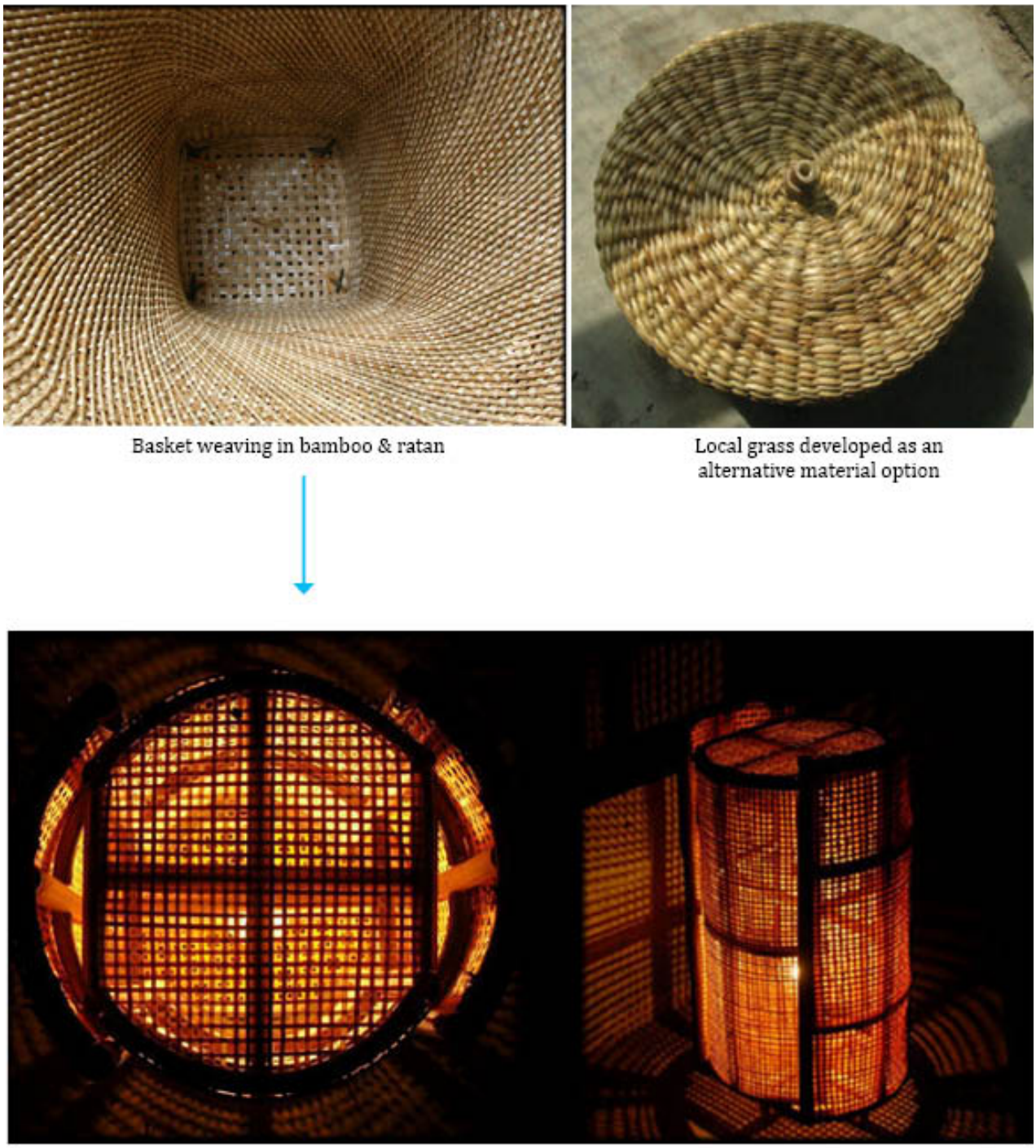


Fig 5: Natural fiber weaving research and development, Dimapur and Mumbai, 2005

This project focused on three interconnected research domains: alternative natural materials, testing and application of natural dye finishes and developing efficient manufacturing processes for new product language. Local kona grass and wild fern was tested and applied as suitable alternative natural fiber materials in case of depletion or non-availability of existing natural fiber materials (bamboo and rattan). Local herbs (turmeric, alta, and mehendi) were tested and applied for natural dye finishes resulting in a new range of colourful products. Development of moulds contributed to increased manufacturing efficiency to meet high product demand. Non-powered manufacturing process was used to create novel product geometry.

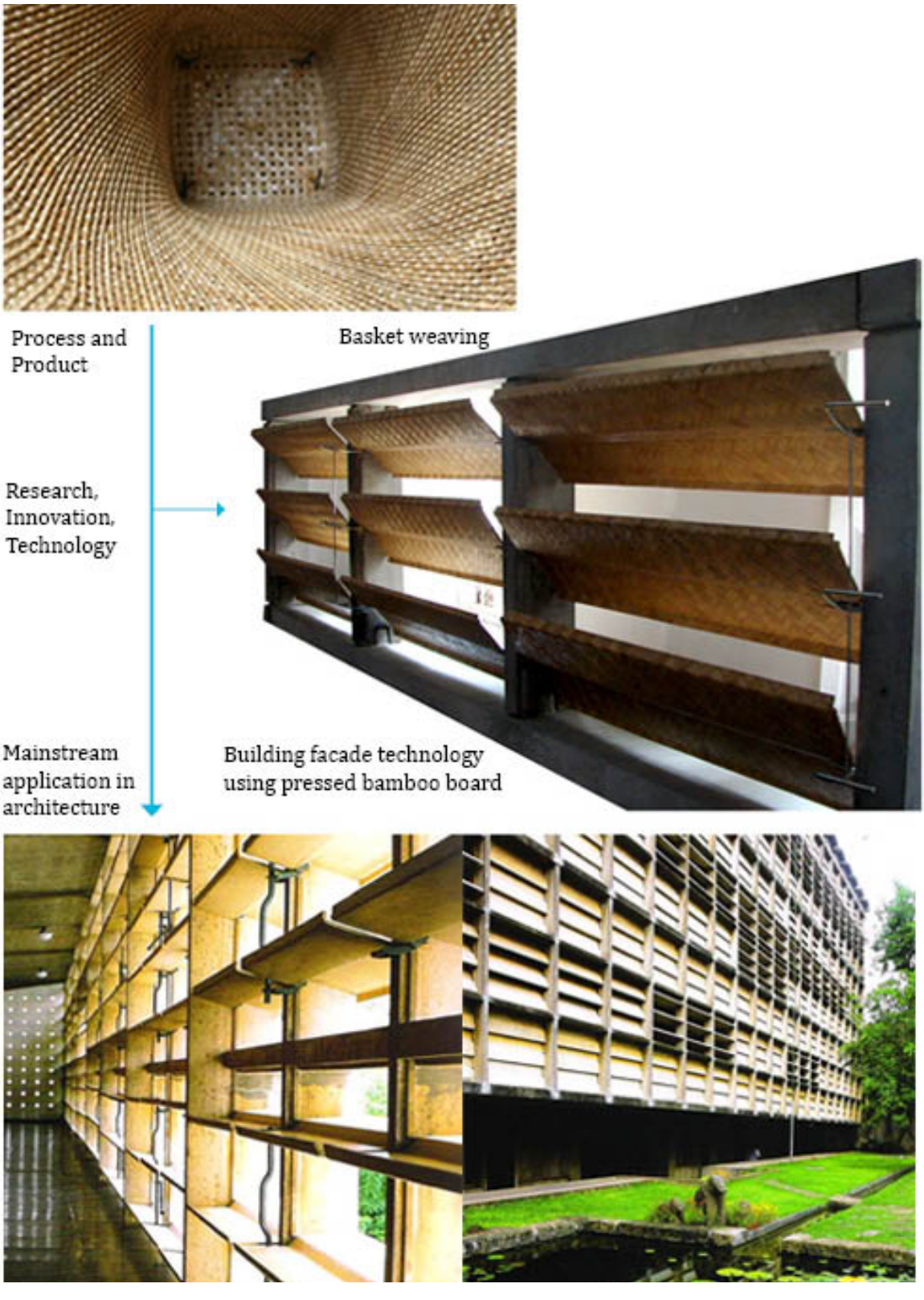


Fig 6: Pressed woven bamboo technology for tropical building façade, Bangalore, 2016

Building technology leveraged traditional timber louver and existing pressed bamboo board technology to develop a low-cost building façade solution for mainstream use. The new pressed bamboo board louver performs as a structural façade with waterproof and fireproof performance. The manufacturing method uses a press mould to allow high volume production and standardisation. The connecting mild steel forged hardware is embedded as part of the pre-cast concrete structural frame. A full-scale component based test bed was developed (shown above) to test all components within the system and improve its overall performance. The technology is currently undergoing field tests.

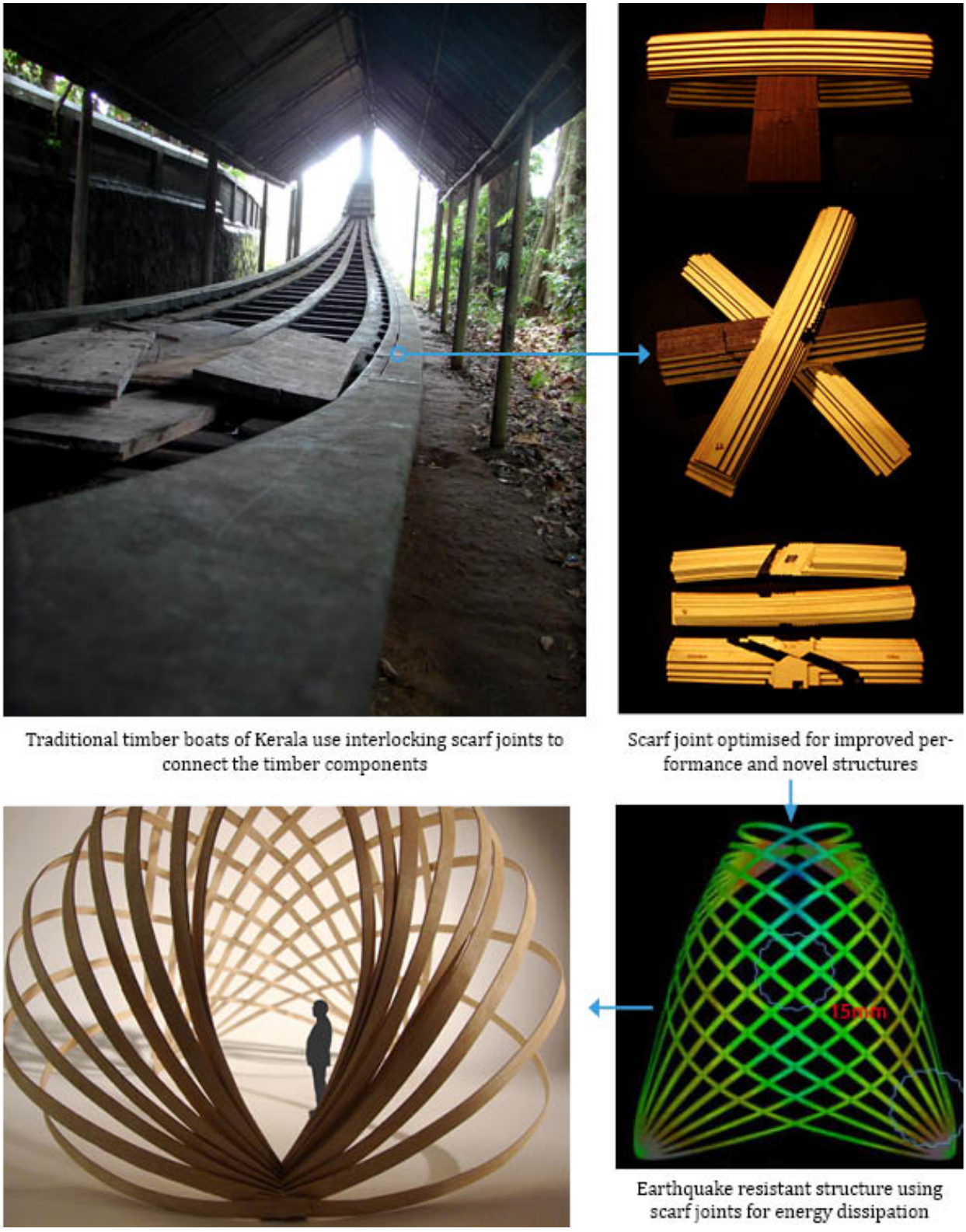
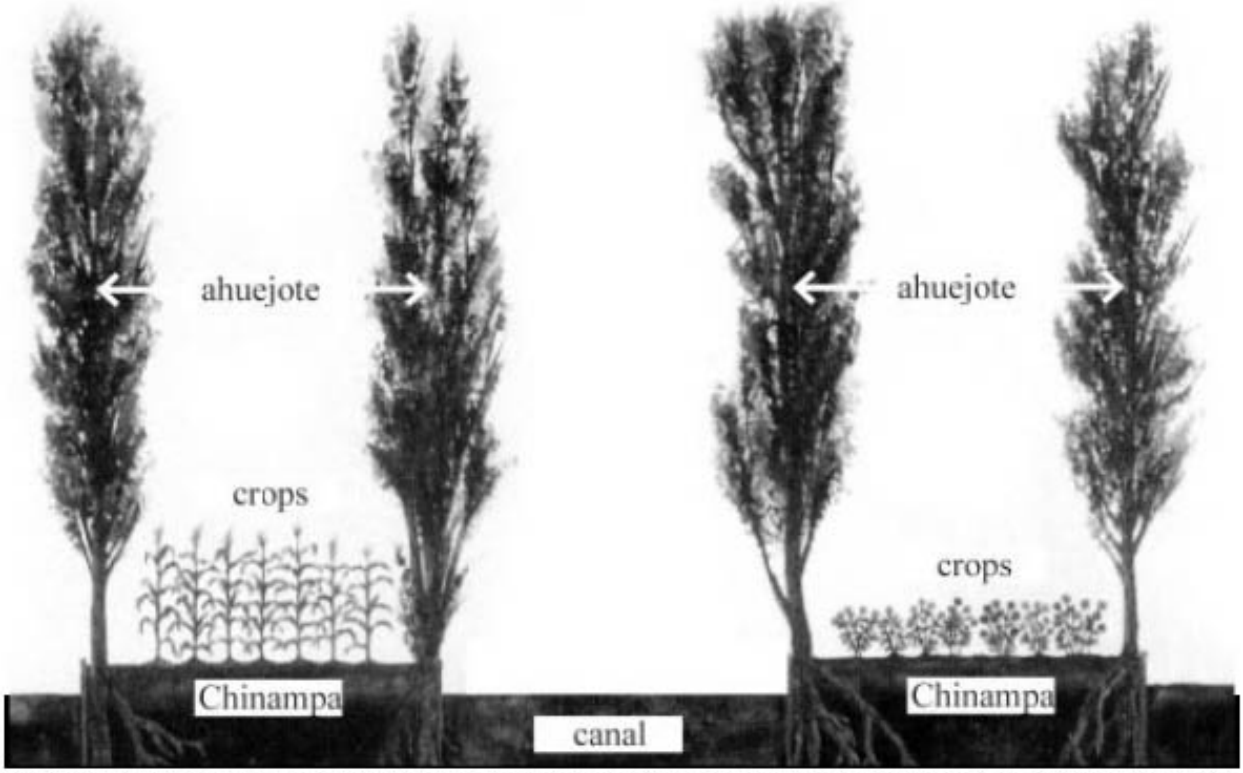


Fig 7. Earthquake resistant timber structural system, London and Trivandrum, 2010

This project developed a novel earthquake resistant structural system based on the traditional snake-boat (or palliyodam) construction method of Kerala and basket weaving methods of North East India. Traditional interlocking scarf joint used in the snake-boats were optimised and tested as part of friction based energy dissipation strategy. The relationship between seismic performance of timber structures and basket weaving was studied for developing the overall system morphology. Timber grid shells were studied as reference models for assembly and fabrication of the structure. Physical and digital tests were carried out to validate the performance with a full-scale test bed.

In addition to the four case studies discussed above, the author would like to highlight two more case studies, which have combined the pillars of conservation, research based innovation and grass root entrepreneurship to revitalize cultural and biological heritage at a macro level. The first case study highlights the restoration project of Xochimilco (the place of flowers) in Mexico where the ancient connection between local communities and their aquatic environment has been revitalized through an interdisciplinary collaboration focused on hydraulic rescue, agricultural rescue, and archaeological rescue. For centuries the indigenous communities of Xochimilco had demonstrated a deep understanding of their natural aquatic environment by balancing individual economic needs with collective ecological needs. Embracing their waters with a sense of innovation and imagination, they developed a network of canals and floating Ahuejote[5] based orchards (known as Chinampas) to establish commerce and exchange, and secure local resource needs. Construction of aqueducts for supply of fresh water and a dike to segregate brackish water from fresh water was perfected to sustain the native population. These solutions optimised local materials, skills and resources to ensure long-term sustainability and balance in a challenging environment. However, at the end of the 19th century, this traditional knowledge was lost and Xochimilco collapsed under severe pressure from the rapid and uncontrolled growth of neighbouring Mexico city. Xochimilcos' natural wealth, agricultural production and fresh water springs satisfied the growing demands of Mexico, and soon led to Xochimilcos' decline and eventual destruction. As part of an extraordinary government initiative, the Xochimilco restoration project was launched through a unique collaboration across the fields of hydrology, agriculture and archaeology. Drinking water availability was first secured through construction of drainage network, regulation lagoons and reforestation of the Chinampa and mountainous zones. Secondly, the soil quality was repaired through use of organic matter from purified canal mud, while economic incentives and technical education on agricultural and trading methods promoted farming and commerce. Thirdly, specific sites of historical or archaeological merit were identified, ensuring the protection of the ancient Chinampa agricultural system. Today Xochimilco is a UNESCO world heritage site[6] and a global eco-tourism destination (Fig 8).

The second case study of Evian Natural Mineral Water in France demonstrates a sustainable closed-loop cyclical economy through a multisectoral water protection policy tackling wastewater collection and treatment, town and country planning, wetland protection, biodiversity protection, agriculture and tourism. This policy relies on the association for the protection of the catchment area of Evian mineral water (APIEME), an association, which comprises the villages from the spring area (16 sq km), the villages from the catchment area (35 sq km), the Evian Company and national public bodies. The main principles of this participatory protective policy are: i) favouring both protection of natural mineral water resource and sensitive local development; ii) involvement of collective projects only; and iii) reliance on strong technical support from scientists. The key aim of conservation is to protect the quality of the mineral-rich water that is globally sold by Evian. Maintaining an environmentally friendly agricultural system through economic policy instruments[7] and teaching of best practices is an essential strategy to ensure sustainable development of the farms and underlying agricultural practices. As part of implementing sustainable agricultural practices, APIEME and Evian have installed a methanisation plant in the catchment area, which will create 1.7 million cubic meters of biogas resulting in a 2000 tonne annual reduction of CO2. APIEME also ensures that local development needs are met without disrupting the existing water cycle. This is achieved by extending sewerage systems, treating wastewater, teaching ecological gardening and reducing salting procedures during winter by focusing on alternative snow removal measures. With the global success of Evian mineral water, APIEME has succeeded in protecting the local assets, environment and biodiversity that created the water resource in the first place. The Evian natural mineral water case study, and the partnership between Evian and APIEME is an exemplary example of sustainably generated abundance in a closed-loop system, where economy and ecology enhance and facilitate each other (Fig 9). In 2008 the International Ramsar Convention recognised the Evian region in France as a 'wetland of international importance'.



Traditional knowledge of chinampas revitalized through hydrological rescue, agricultural rescue and archaelogical rescue by combining scientific research and innovation with grass root entrepreneurship

Agricultural production: Cuemanco plant market in Xochimilco is the largest in Latin America

Eco-tourism: Xochimilco (the place of flowers) is a world heritage site

Fig 8. Restoration of Xochimilco, Mexico

The World heritage site of Xochimilco is a compelling case study for revitalizing natural biological and cultural resources through collaboration between the government sector, scientific sector and social sector. Treating water as a critical national issue, the Mexican government has recovered and revitalized the region creating a global best practice for conservation, grass root entrepreneurship and eco-tourism.

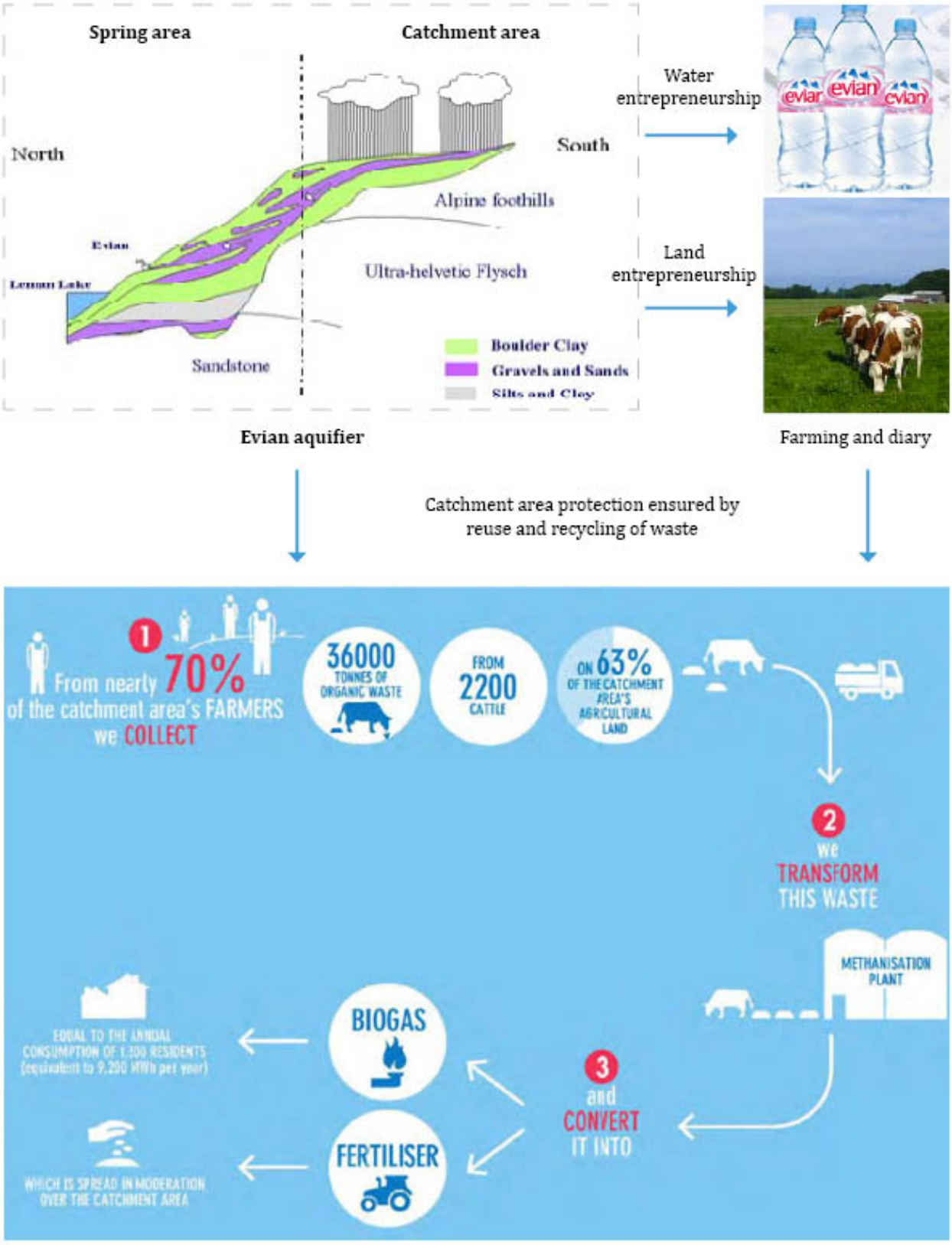


Fig 9. Evian Natural Mineral Water, France

Evian is a global brand of bottled natural mineral water originating from preserved areas in France. The partnership of Evian and Association for the protection of the catchment area of Evian mineral water (APIEME) demonstrates the convergence of economy and ecology. The underlying policy has evolved to create a closed loop system for generating sustainable abundance for all stakeholders

3 Towards convergence

This paper proposes a convergent strategy and vision for revitalizing bio-cultural heritage and traditional knowledge with local communities. Through six case studies the author has attempted to highlight the potential of research based innovation within an entrepreneurial framework, and bring forth the need for an experimental approach to revitalize and reimagine the past. Meghalaya offers a rich repository of traditional knowledge based practices and natural bio-cultural resources, which deserve a sensitive and innovative approach. By applying the three pillars of 'conservation', 'scientific research' and 'entrepreneurship' the author proposes development of integrated solutions, which balance ancient wisdom with contemporary science. Such an integrated approach can lead to cyclical closed-loop economies where preservation and development are interdependent and interconnected; where ecology and economy merge to ensure collective wellbeing; where convergent solutions nurture responsible development for collective benefit. The author hopes to inspire the residents of Meghalaya and other parts of North East India to come together and conserve their surroundings through a responsible approach. Can the residents rescue and transform the Wah Umkhrah river in Shillong into a catalyst for growth and development? Can the indigenous communities collaborate with the state to conserve and replicate the living root bridges of Southern Meghalaya for a responsible tourism and livelihood initiative (Fig 10)? Can Meghalaya safeguard its natural assets through innovative participatory solutions? Can the state demonstrate integrated development at multiple levels and create a precedent for North East India? Can it address the impact of human activities on natural ecosystems and encourage nature-based entrepreneurship? Can the state define thresholds for natural resource use and underline the concept of 'limits'? Can local communities apply the concept of 'balance' in the context of natural resource management? Can visitors learn the fragility of these natural ecosystems and support local communities in their efforts? Perhaps, the Xochimilco World Heritage Site in Mexico can encourage Wah Umkhrahs' rescue and transformation. Perhaps, the Evian Natural Mineral Water case study from France can inspire new nature based products and services, which converge economy and ecology. The author hopes this paper will inspire a convergent vision for the future where economic, cultural and ecological growth is entwined for long-term collective benefit.

Fig. 10: Community led ecosystem service of Living Root Bridges, Meghalaya

4. References

[1] http://www.sanjeevshankar.com/shoe2.htm

[2] Women Artisans Exporting Leather Sandals. http://www.keepeek.com/Digital-Asset-Management/oecd/commonwealth/trade/trading-stories/toehold-in-india-women-artisans-exporting-leather-sandals_9781848590441-24-en#.WDMlViN96_I%23page8#page2

[3] http://www.sanjeevshankar.com/cane2.htm

[4] http://www.sanjeevshankar.com/wovensystem.html

[5] Ahuejote, a common name of Salix bonplandiana, is an essential part of the flora of the lake systems of the Valley of Mexico. Salix refers to willow in Latin. Ahuejote grows forming riparian forests and is used as a living fence on the banks of canals and dams, and for medicinal and ritual purposes. During the pre-Hispanic era, the Mesoamerican Indians used it to develop floating orchards (or Chinampas), and serve as windbreaks to protect the crops. http://conabio.inaturalist.org/taxa/69993-Salix-bonplandiana http://www.biodiversidad.gob.mx/Difusion/cienciaCiudadana/aurbanos/ficha.php?item=Salix%20bonplandiana

[6] http://whc.unesco.org/en/list/412/

[7] Refers to payment schemes for ecosystem services. http://www.feem-project.net/epiwater/docs/d32-d6-1/CS19_Evian.pdf