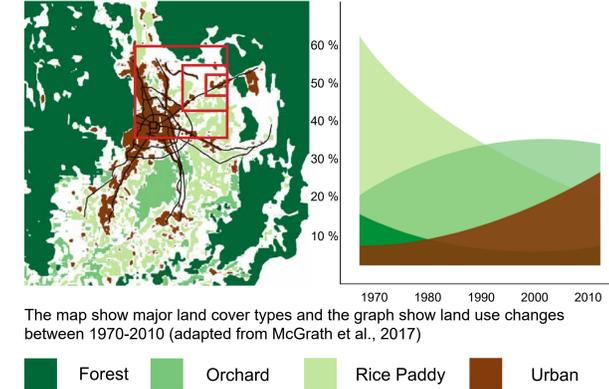


The Alternative Future of Chiang Mai: Green - Blue Infrastructures and Resilient Rural Landscapes

Chiang Mai, the capital of an ancient Lanna Kingdom in Northern Thailand, represents human creative in urban planning. Seven hundred years ago, King Mengrai gave much forethought to city planning and founded the moated city on the foothill of Doi Suthep-Pui mountain. To the East of the city was a fertile valley of Ping and Kuang Rivers. The lower basin floodplain support the productive wet rice cultivation that sustainably supported this large city and the region and continues to do so at present time.

After the four decades of urbanization and development in the region, Chiang Mai remains a high amenity area of ecological and cultural importance with great scenic beauty and increasing tourist, leisure, retirement and second home demand. Comprehensive planning favors the system of the main urban center and the routes crossing the territory connecting to mountain's leisure and recreation amenities, while the agricultural zone of the flood plain in between has been neglected.



Traditionally, rural landscape of Mae Kuang Valley used to be very intertwined with landscape and its functions and processes. Socio-ecological ecosystems are increasingly vulnerable to modern development, with impacts including disruption of food production and water supply, altered resilience of ecosystems and consequences for human well-being. Since human activities have impacted on nature, a better synergy should be established between the two to ensure sustainability.

Assumptions and Innovations

Assumptions:

The green - blue infrastructure is a multi-scaled solution to challenges of the future. Green - Blue infrastructures are important mediums that facilitate processes that shape the built environment and socio-economic and cultural landscapes. Movement and flows are at the core of these landscape infrastructures.

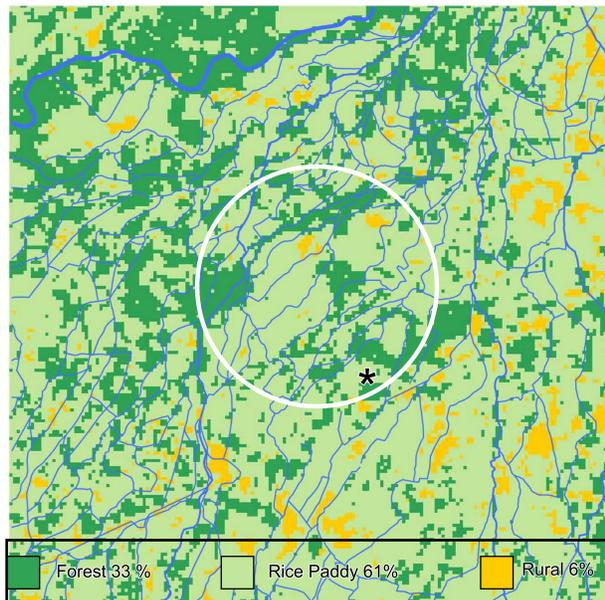
Innovations:

Green - Blue Infrastructure

"Greener, healthier, attractive towns and villages sustainably connected to the rich tapestry of distinctive landscapes, wildlife habitats and waterways – valued, enjoyed and cared for by local people." (Maidstone Borough Council, 2016)

Rural Resilience

"Rural resilience may be defined as the capacity of a rural region to adapt to changing external circumstances in such a way that a satisfactory standard of living is maintained. This also includes the capacity to recover from management or government mistakes." (Heijman, Hagelaar, & Heide, 2007)

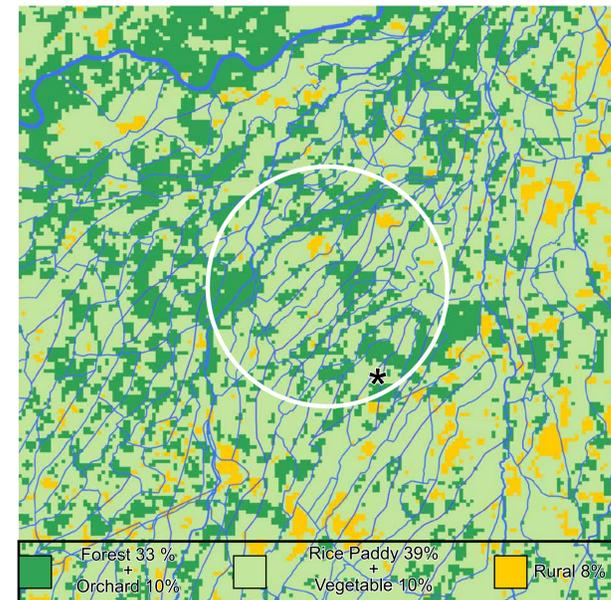


Existing Situation 2020

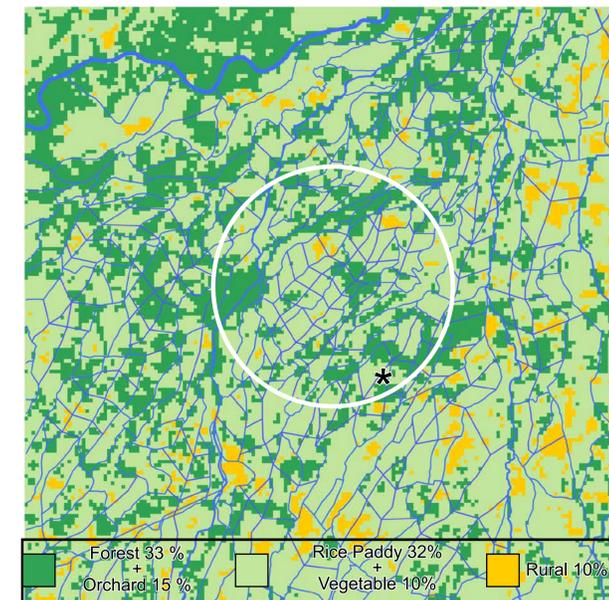
LANDSCAPE AS GREEN - BLUE INFRASTRUCTURE

Modern day developments, urbanization poses considerable stress on the landscape and require that we rethink the planning and design of infrastructures while being sensitive to environmental issues and sustainability.

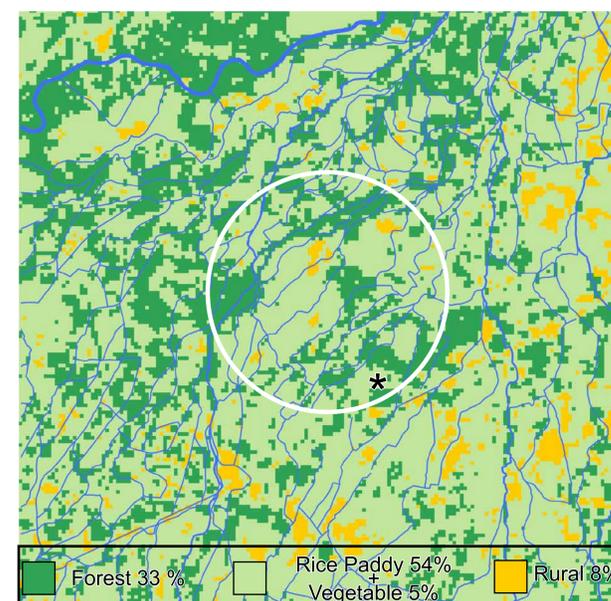
Green - Blue infrastructures can take on multi-roles depending on how it is designed. The design interventions are centered around creating "flowscapes" that facilitate the movement and flows of core elements of the landscape - mobility for humans, better quality flows in rivers, muang fai systems and irrigation canals, thriving animal and plant communities through green - blue corridors. Hence, the strategy of the alternative planning and design is to intervene on the landscape with the concepts and practices of green - blue infrastructures, theorizing that landscape is an efficient medium that has the potential to be used to unify ecological, social, economic and cultural processes for the agricultural community of rural villages.



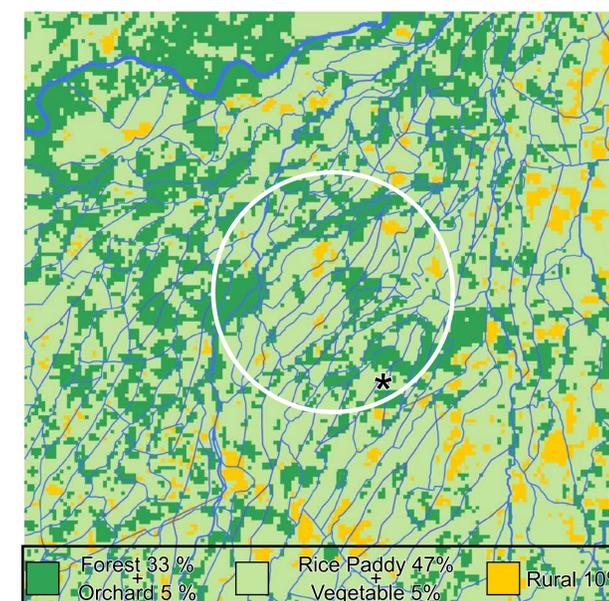
Early Adopter 2035



Early Adopter 2050



Late Adopter 2035



Late Adopter 2050

SCENARIO A: THE EARLY ADOPTER

The early adopter can utilize the improved green - blue infrastructures to response to emerging and expanding new markets such as organic farming and cultural tourism while maintaining unique local cultural characters. Also the improved green - blue infrastructures will enhance the resilience of the communities ecologically, socio-economically and culturally to absorb, adapt or transform in response to different kinds of changes, perturbations or disturbances.

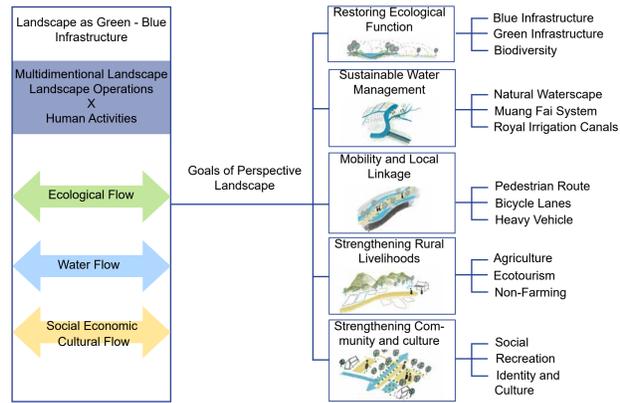
Most of the transformations - a result from adapting the strategies would occur internally. There are insignificant changes in terms of land areas such as the increasing of orchard and vegetable farms would be the result of rice paddies conversion to diversify agricultural productivity. Also the increasing of built up areas is small because most of the changes would be increasing density in a low density residential areas.

* Major change is changing in pattern and density of irrigation canals.

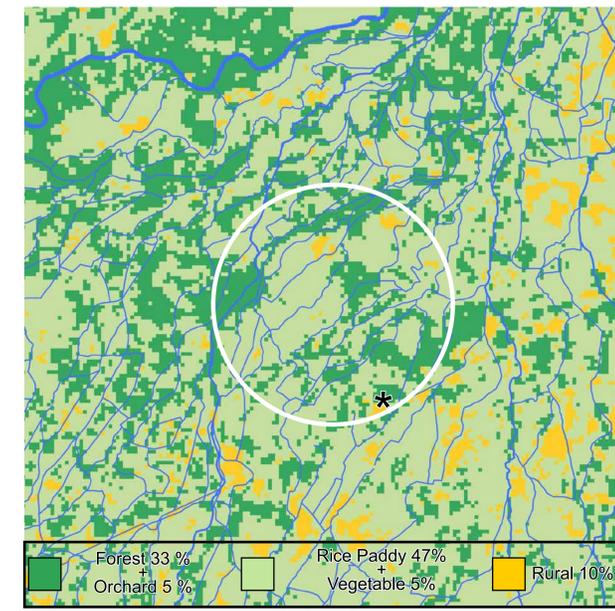
SCENARIO B: THE LATE ADOPTER

Since the rural villages of Chiang Mai already have their own existing infrastructures and the way of living, the main strategy seeks to build upon these infrastructures to enhance functionality. Strategies will look to reorganize, reactivate, repurpose, restore and strengthen existing landscapes into a multi-functional and resilient landscape. Revaluation of the community's hydro-agricultural pattern in order to provide space, environmental moderation, water-quality maintenance and new perspectives is critical.

The late adopter will take advantage of learning from the dynamics of changes and the impacts then adjust the strategies accordingly. But improving green - blue infrastructures remains the core strategy to build absorptive capacity, adaptive capacity and transformative capacity. Changes in terms of land areas remain insignificant. Most of the changes would be in the form of capacity, diversification, efficiency, resiliency and sustainability.



Significantly different from hard infrastructures such as roads and drainage systems, the existing traditional infrastructures will be improved with green - blue infrastructures principles and enhanced to increase resilience capacity of the villages. Connectivity is a key concept in this design and planning approach encompassed by resilience theory to capture a set of strategies for resilient socio-ecological ecosystems.

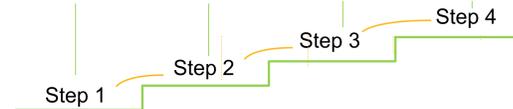


Non Adopter 2050

Rural life depends on the dynamics of ecosystems which changing seasonally. People utilize resources directly and indirectly from landscape known as ecosystem services. The ecosystem services provide not only the basic needs of people but also cultural services

The sustainable hydrosocial matrix of the river, networks of irrigation canals, rice paddies and villages have been overlaid by new roads, highways, dam, regional irrigation waterways, new settlements and new urban developments.

Basic needs	Modification	Social	Culture
Habitat Land Water Food Fiber	Production Distribution Consumption	Grouping Relationship Rules	Traditional Culture Spiritual



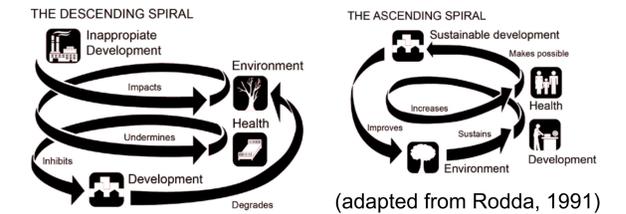
Informations are analyzed in the step of cultural development and arranged by type of landscape elements. (Nilanon, 2017)

SCENARIO C: THE NON-ADOPTER

Although the non-adopter will not rely upon the same strategies to look for the future, but improving green - blue infrastructures is a necessity. With strong traditional knowledge and social capital will take the communities to a certain level with limitations. Enhancing indigenous knowledge and traditional system potential and mitigating their limitations with practical technology is a key. Changes in terms of land areas remain insignificant.

Indigenous knowledge create sufficiency at the community or organization level based on cooperative activities with their neighbors within community on the ground of a concept of sharing excess resources of each household. As a result of combining with appropriate technology, sustainability in terms of food safety and security for households and maintaining resources and environmental quality can be achieved. Moreover, resilience and adaptability at individual and community level will create an invaluable capacity to prepare and mitigate environmental disasters.

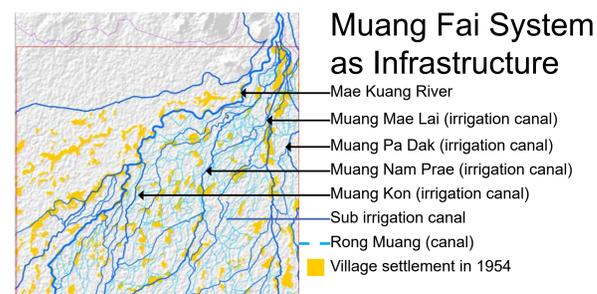
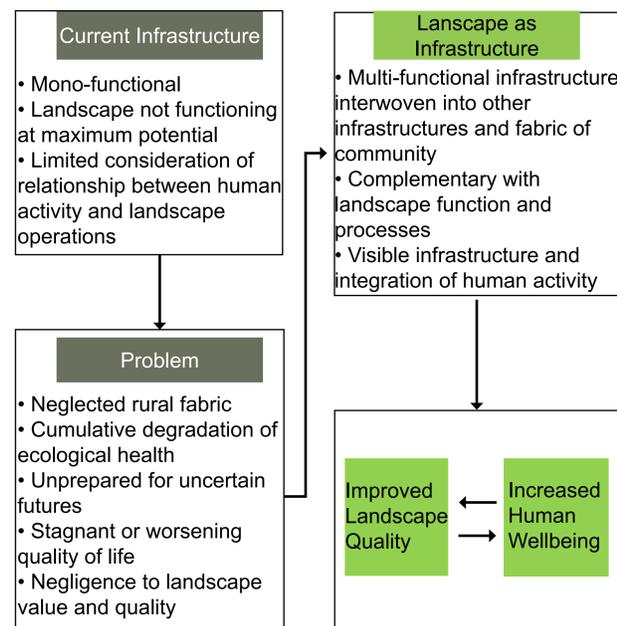
Unsustainable Rural Development Sustainable Rural Development



Traditional Ecological Knowledge as Cultural Landscape

"For centuries, rice cultivation in the alluvial plane and surrounding foothills of Chiang Mai has been skillfully irrigated to capture monsoon rainwater in a complex weir and canal system with a remarkable social organization" (McGrath and Barceloni Corte and Sangawongse, 2013)

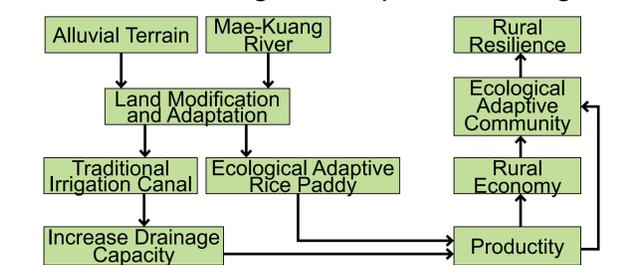
The dynamics of the interaction between human activity and landscape operative processes can be taken into consideration to the design interventions, when problems or successes from historical and traditional case studies are made aware.



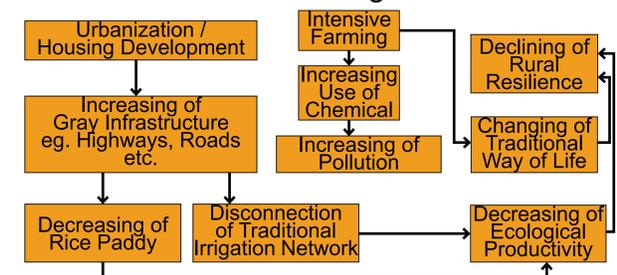
The map shows the hierarchy and the system of muang fai water system. The main irrigation canal (Muang Luang) divert water from Mae Kuang River. Then, water will be diverted into smaller canal called Lam Muang (sub irrigation canal) that spread through the agricultural areas.

"The muang fai remain remarkable examples of community based natural resource planning, design, management, adaptation, and resource sharing" (McGrath, 2012)

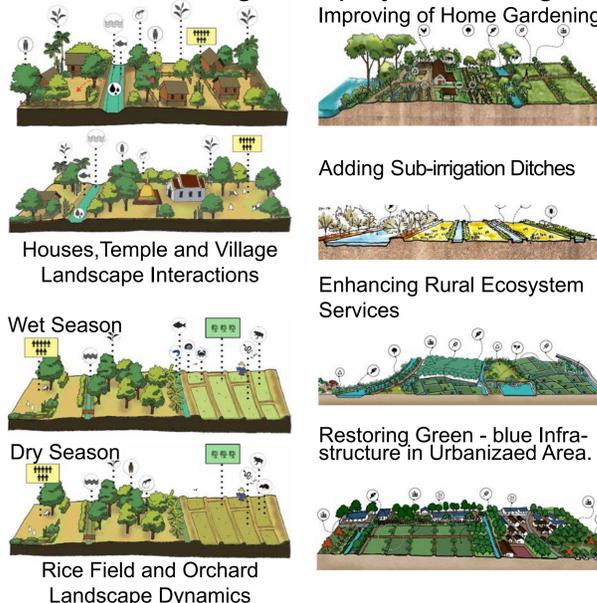
Traditional Ecological Adaptive Farming Model



Modern Intensive Farming Model



Localized strategies deployed on the ground.



Conclusion

Mae Kuang continues to be the major ecological services generator which provides water and nutrients for the fertile valley to now support a large population of the modern city. Not only landscape ecological elements, structures, functions has been fragmented but also socio-economics and cultural systems. Urbanization, Royal irrigation and Ministry of Transportation works has exhausted the delicate hydrosocial balance of the muang fai system, and the river basin today is increasingly fragmented between urban and rural, land and water based uses.

The ingenuity green - blue infrastructures that formed by the river and the canals will face new challenges beyond traditional ecosystem services in a form of reconnecting and regenerating the fragmented mosaic of locally managed and locally recognized communities and landscapes and regional and global driven developments, communities and landscapes ecologically, socio-economically and culturally.

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