Emily Portman, Riley Liptak, Betsy DeNooyer, Kadilyn Knief
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Ajaan Mark Ritchie and Ajaan Christina Fink
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River Bank Indicators of River Health and Ecological Sustainability of the Chiang Mai Section of the Ping River.

Methods:

In order to asses the current state of the river we measured use and maintenance indicators. These included types of buildings, presence of docks, fishermen or other recreational users, as well as specifically detailing the size, shape, and material components of banks and vegetation both on the shore and mid-river. This data was compiled on 2/9/2010 between 1 and 4 p.m. beginning at the Chiang Mai-Lampang Road Bridge to Wat Chai Mongkol via kayak. We kayaked roughly a 3.5 kilometer section of the river, and then divided this section into 25 smaller sections for the sake of observation. The bank heights and slopes recorded were visually estimated.
On Day 2 of research, we gathered local knowledge of the Ping river though informal interviews with a fishermen, fish sellers within *Kad Luang* (Warorot Market), a monk, a riverside resident and restaurant owner and her husband, and office workers at Mea Ping River Tours. These interviews were conducted in Thai language on 2/10/2010 between 1 and 4 p.m.

Results and Discussion

From observational data it could be estimated that 70% of the east bank has been channelized with cement while 40% of the west bank had cement retainment. Most of this retainment on the west bank was centered on either side of Warorot market. The west bank was primarily dirt, soil and vegetation. Bank heights and slopes tended to vary with each change in land plot. Restaurants and businesses on both banks tended to import plants and maintain cultivated landscapes with more gradually sloping banks. Many homes had small docks and some had small plots of farmable crops (three recognized) as evidenced by individuals harvesting riverside greens at two homes (these were all seen at the northern most portions of the river). 28 fishermen were seen (15 on the west bank and 13 on the east bank) and fishing nets were also witnessed. The trends on both sides generally became more commercial as we moved farther into downtown Chiang Mai (bank maintenance shifted from natural to mixed material to manmade). None of the banks from the 3.5 kilometer segment we documented remained completely unaltered by human impact. Collectively individual perceptions of the river are that its health has declined. Fish from the river is still caught and eaten recreationally, however, fish sold in the market is caught elsewhere and fish stocks are much fewer than they once were. In the past the river has been used for drinking, bathing, and fishing. A local couple who have lived on the river for their entire lives mentioned that the channelization twenty years ago to route the river away from the expanding *Kat Luang* was a turning point in the rivers health. It had been ten years since they had bathed in the river and fish were significantly smaller and scarcer due to the loss of vegetation. Two versions of Morning Glory, *Pak Boon* and *Pak Chamun Pi,* were pointed out as edible plants.

However, *Pak Dop Cha Waa* (a type of Water Hyacinth), a floating non-edible plant, was the most abundant species on the river.

Connections to Sustainability:
A river system is important in assessing sustainability due to the varied resources a healthy river can provide. If a river is properly maintained it can provide a food source (fish, crabs, shrimp), clean drinking water, etc, allowing a city to be increasingly self-reliant. From ethnographic data it can be suggested that the river has seen a decline in ecosystem health in conjunction with development.