

Preventing Landslides in the Honghe Hani Rice Terraces

Abstract:

The Honghe Hani Rice Terraces of Yunnan province have become a national emblem for China and a UNESCO World Heritage Site, but some are beginning to crumble. This research attempts to address why this is happening and what can be done about it. Previous work has failed to adequately address the possible shortcomings of recently introduced seed and water management technology and their particular effect on rice terraces and the people who depend upon them. In an effort to better understand the issue, field observation was triangulated with in-depth interviews with local people, and the examination of scientific literature. To do this, I spent time in China with a translator in a key village known to be first in the area to truly succeed in carving the rice terraces and in making the mountain slope irrigation system required work. Results indicate that while the new seed and technologies do save water and improve lives, coupled with the recent increase in migration off the mountain they may also be threatening the long-term viability of rice terracing in the region.

Highlights:

- The impact China's super-efficient hybrid rice has had on poverty is astonishing.
- Hybrid rice may actually be too water efficient to prevent terraces from crumbling.
- Agroforestry and intercropping old and new rice breeds together may be the answer.

Figure 1. Damage diagram; crumbling paddies.



Table 2. Impact Assessment, old rice (OR) vs. new rice (NR)

Impact	Old Rice	New Rice	Reasoning
Impact on Women	Worse	Better	NR: More available time and physical energy for education or other income-earning activities
Impact on Men	Worse	Better	NR: Men may be calmer when they feel they are providing for their families' basic needs, and their futures. Less conflict with neighbors or wife on account of scarcity of basic resources ⁱⁱ
Impact on children	Worse	Better	OR: Hunger, high risk of abuse, lack of basic needs and access to education and vaccines ⁱⁱ
Girls	Worse	Better	OR: Time and energy consuming, increased potential abuse, little to no access to education ⁱⁱ
Boys	Little to None	Better	OR: Higher risk of abuse from starving parents
Elderly	Worse	Better	OR: Starvation, depression, lower life expectancy
Hunger	Worse	Better	NR: Animal and human hunger satisfied, at all ages
Animal protein	Worse	Better	NR: Despite additional input costs, more time, energy and resources are available for other income-earning activities or study
Economic possibilities	Worse	Better	NR: Animals are satisfied with less and have more fodder available, improving life expectancy, reproduction and meat
Ecology	Better	Worse	NR: More chemicals required, reduced soil stability and aquifer recharge.
Human Health	Better/ Worse	Worse/ Better	OR: Less exposure to harmful chemicals, but fewer calories available NR: Increased exposure to pesticides, but more calories available

Data Source: Author Survey. Respondents were village leaders, asked to tell the story of how their people came to this mountain, and how the rice terraces were formed.

i Li, J., Xin, Y., Longping, Y. 2009. Hybrid Rice Technology Development: Ensuring China's Food Security. IFPRI Discussion Paper 0098. International Food Policy Research Institute, Washington, DC. Available online at http://www.ifpri.org/sites/default/files/policy-reports/old_rice_ifpri_dp0098.pdf



Table 1. Resource Comparison, old vs. new rice

Dimension	Old Rice	New Rice	Reasoning
Quantity Available for humans	Less	More	Higher yield ⁱ
Quantity Available for fodder	Less	More	New plant produces more straw ⁱ
Quantity Available for fuel	Less	More	Straw burns more slowly ⁱ
Land required	More	Less	Higher planting density possible ⁱ
Water required	More	Less	50% less water required ⁱ
Time and energy required	More	Less	No need to pick up stalks and tie them together after a storm to rescue them (women). However, pesticide application is required (men) ⁱⁱ
Non-labor inputs required	Less	More	Seed, pesticide, sometimes fertilizer, plus equipment for application ⁱ
Drought resilience	Less	More	Less water required throughout the cycle ⁱⁱ
Flood resilience	Less	More	Strong root system, thicker leaves ⁱ
Wind resilience	Less	More	Shorter, sturdier stalks mean better wind resistance ⁱ
Uses	More	Fewer	Not suitable for southern rice noodles and other regional value-add products ⁱ

ⁱ Li, J., Xin, Y., Longping, Y. 2009. Hybrid Rice Technology Development: Ensuring China's Food Security. IFPRI Discussion Paper 0098. International Food Policy Research Institute, Washington, DC. Available online at http://www.ifpri.org/sites/default/files/policy-reports/old_rice_ifpri_dp0098.pdf

ⁱⁱ Yuan, J., P., S. S. Uprety, and C. X. Mao. 1989. Hybrid Rice: Achievements and Outlook. In: Report on International Rice Research Conference, September 24-25, 1989, Honghe, China. Manila: Philippine International Rice Research Institute.

Figure 2. Old system



Figure 3. New technologies



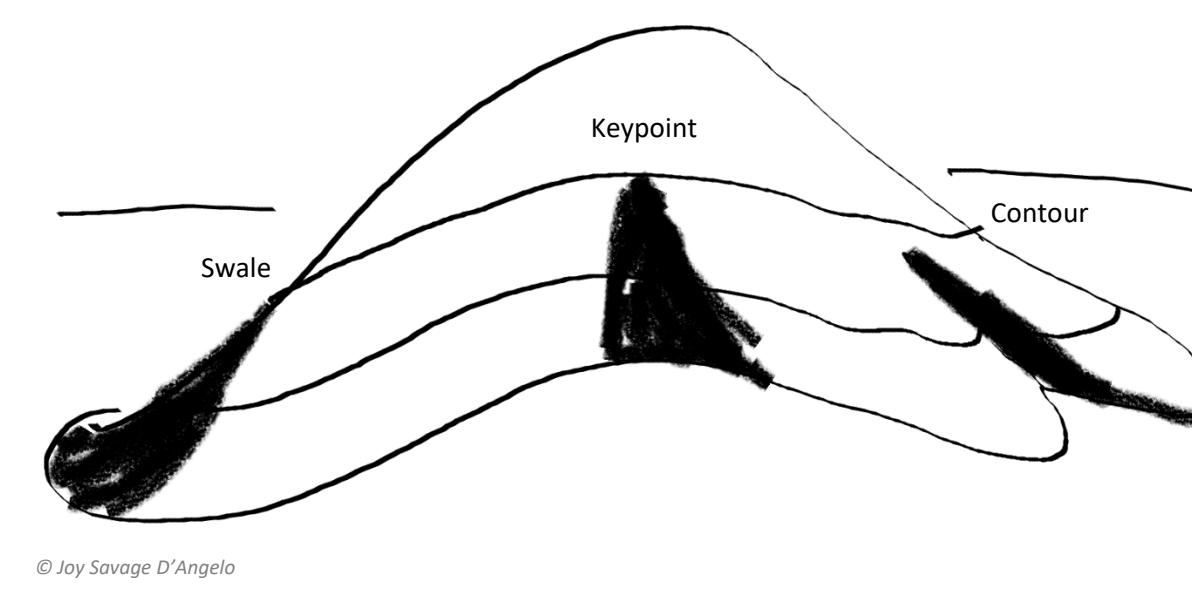
What can be done

1 Strategic intercropping of old and new rice breeds together

Intercropping old and new rice breeds together at strategic locations and increasing local agroforestry may be able to reduce the occurrence of landslides in these Honghe Hani rice terraces, as well as insure the long-term viability of rice terracing in the region. In addition to keeping the paddy wet enough long enough deeply enough to stabilize the soil, the old breed enjoys a stable market. Only the inbreed is suitable for making rice wine, and the beloved traditional rice noodles of the south. The new breed has all the benefits of an increased number of calories available for both human and animal consumption, produced on less land with less water and from less labor.

2 Intensifying agroforestry at strategic locations

Intensifying agroforestry may also help stabilize the soil (Wang *et al.* 2011). Trees interspersed with ground crops has long been a means of improving soil moisture retention and structure for the flatlands but is less often thought of for the slopes. This may be for obvious reasons but can and does succeed with normal tree management (i.e., coppicing, replanting when old, diseased or getting too heavy). When the trees get too big, they can be cut for firewood or coppiced for regenerating supplies needed to make baskets, stools or other high-value, alternate incomes. If planted at strategic locations such as keypoints along keylines, their roots could also help prevent unnecessary erosion of the soil by acting as a retainer.



Contour: Just an imaginary line with all points of altitude the same.

Keypoint: Point on a slope where slope changes from convex to concave.

Swale: Ditch dug along a contour which allows water to percolate back into the hillside instead of running straight down it.

3 Affirming Local Traditional Ecological Knowledge as a Resource

Hani people recognize how and where to direct path side streams of water along steep hills for percolation in such a way as prevent the land from falling (i.e., they understand swales, penetration, saturation, slope and fall). They also know that one must keep one's field flooded to keep it from falling, they have appropriate tree species available, and are generally aware of how biodiversity brings greater ecological stability. However, with the introduction of new technology, some local people have lost confidence in their knowledge of local ecological systems. It may simply be a matter of reaffirming to them what they already know.

4 Stronger together

The follow-on benefits of this combined reinforcement could be powerful: increased biodiversity, diversified income, and better-secured livelihoods. The combined presence of trees, the old rice, new rice, corn, soybeans, tea and other fruits and vegetables already grown in the area, may help produce the biodiversity needed to keep the soil rich, the plants strong and healthy and better able to resist pests and disease. (Brussard *et al.* 2007).

5 In the meantime

Because these solutions take time to realize impact, short and mid-term solutions may additionally be needed while implementing the long-term strategies.

Figure 4. Communication Card

