

What determines the resilience of local communities?

A comparative analysis between Landcare and a pond irrigation system in Japan

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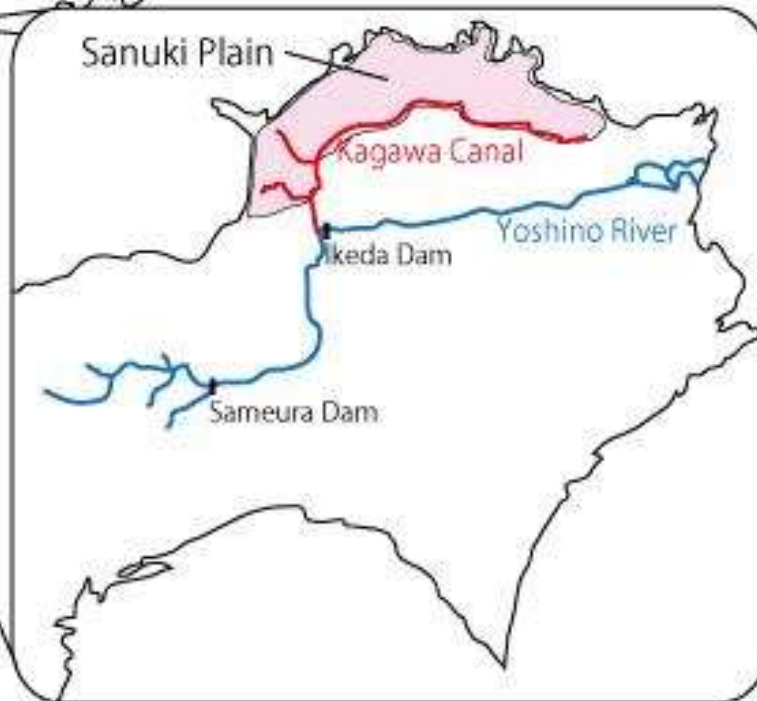
Nagoya

Sanuki Plain (Kagawa prefecture)

Area: 1,876 km²

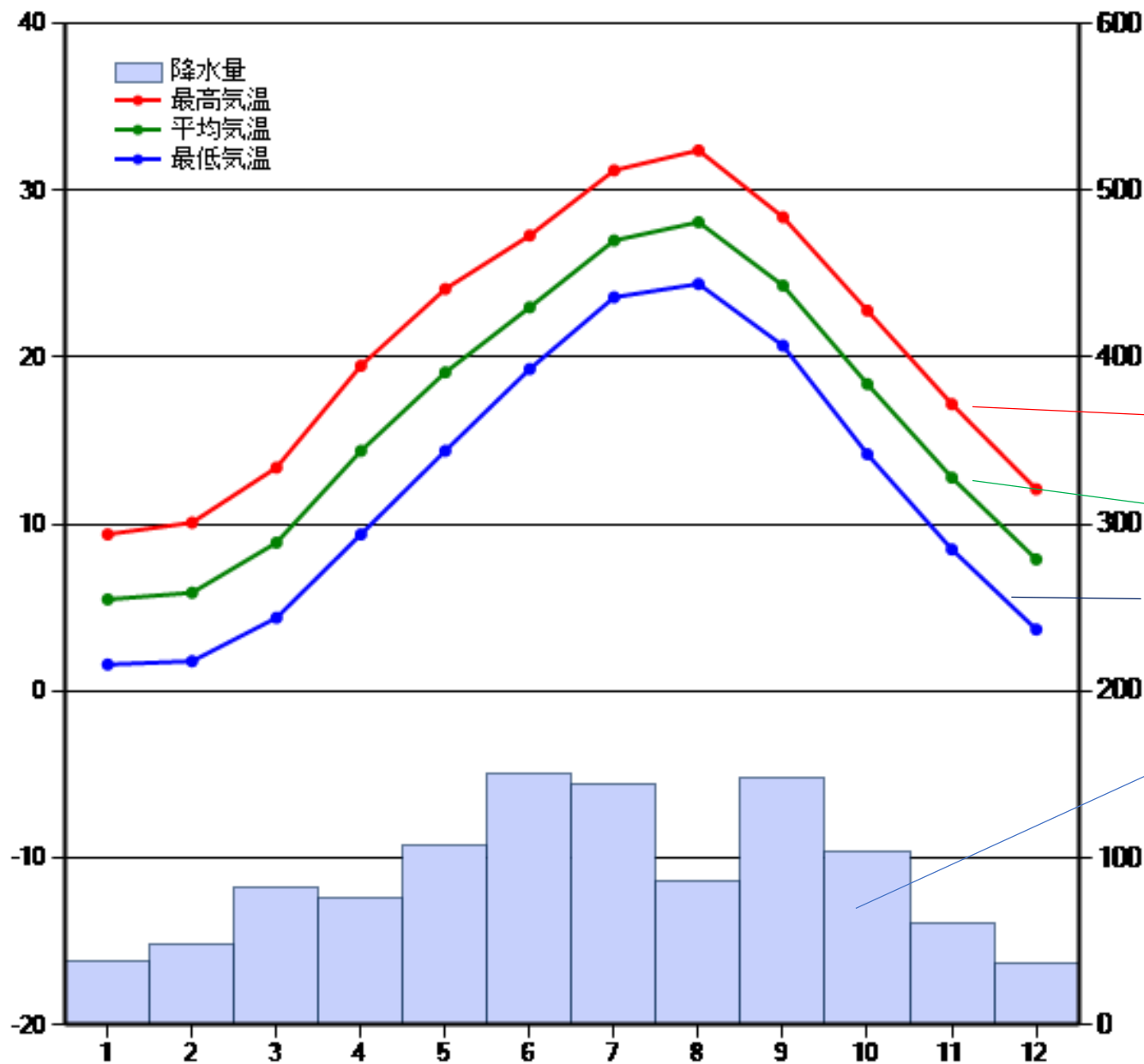
Population: 970,000

Main crops: rice, lettuce, orange, olive



(°C)

(mm)



Annual temperature
and precipitation in
the Sanuki Plain
(Takamatsu city)

Max. temp

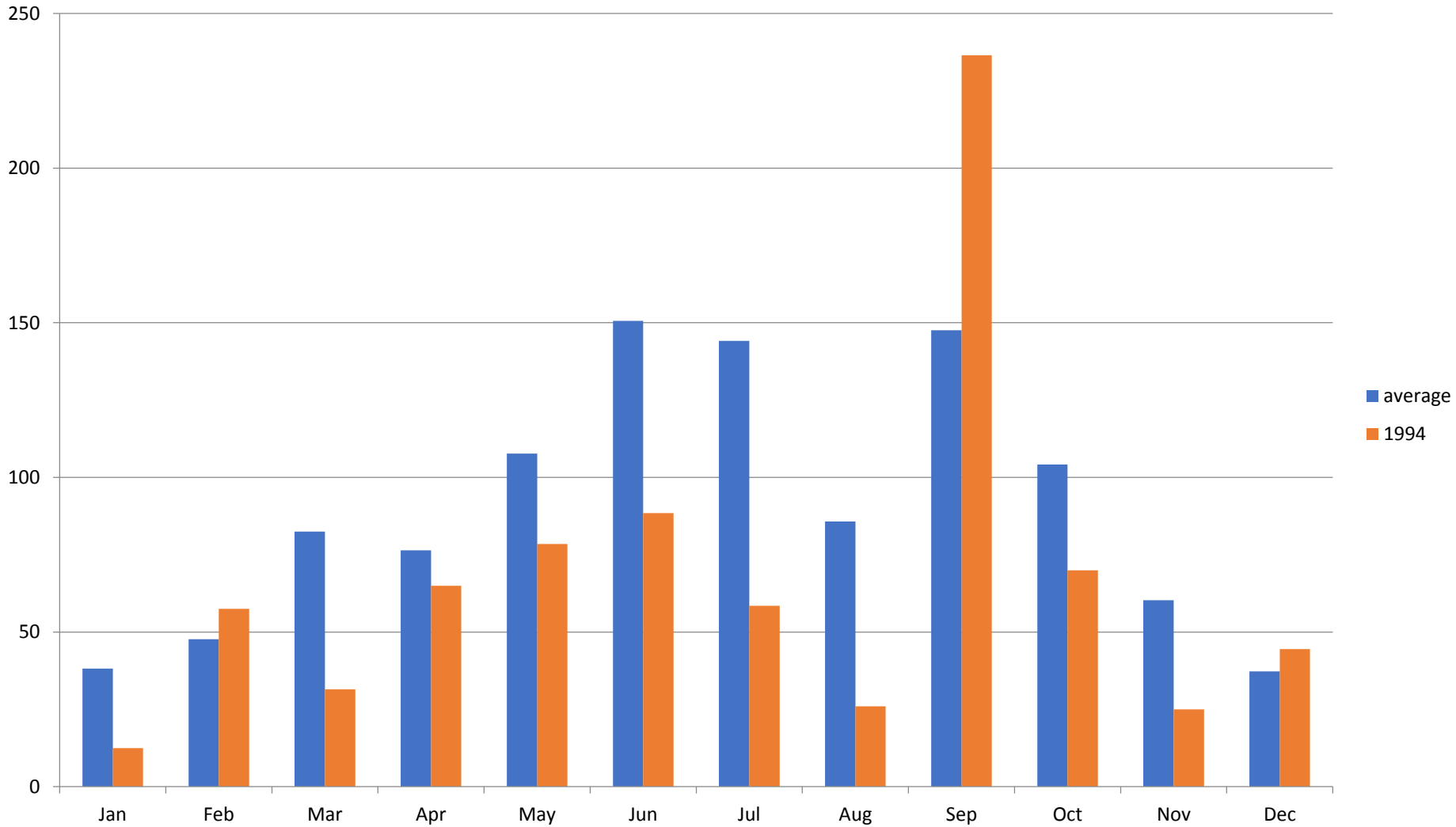
Mean temp

Min. temp

Precipitation

Mean temperature: 16.3 °C, Annual precipitation: 1082.3mm

Annual precipitation: 1082.3 mm (mean)
Annual precipitation: 794 mm (in 1994)
(Annual precipitation in Japan: 1718 mm (mean))



Source: Japan Meteorological Agency Data

Characteristics of the Sanuki Plain

- (1) Densely constructed local ponds
 - Due to the high scarcity of water, local ponds have been extensively constructed in the Sanuki Plain.
 - More than 10,400 (in 2000)
 - Density: 7.79/km² (in 2000)



<http://www.jcca.or.jp/dobokuisan/japan/shikoku/manou.html>



<http://www.city.takamatsu.kagawa.jp/4868.html>

Characteristics of the Sanuki Plain (cont.)

- (2) Water distribution through the Kagawa canal



Source :

http://www.mizu.gr.jp/kikanshi/mizu_23/no23_g01.html

Yoshino River

- Constructed in 1978
- Conveying water from Yoshino river...
 - 105 million m³ per year for agriculture (30,700 ha)
 - 122 million m³ per year for tap water
 - 20 million m³ per year for industry

Kagawa Canal

Parent pond

Child pond



Child pond



Parent pond

Child pond



Child pond



Drought in 1994

- An extreme drought hit the Sanuki plain in 1994
- The stock of water resources in local ponds for irrigation decreased severely (some of them were depleted).



Drought in 1994 (cont.)

- Sameura dam (source of the water from Kagawa Canal) also decreased.
 - June 29: 30% cut
 - July 8: 60% cut
 - July 16: 75% cut
 - July 24: water intake from the Sameura Dam stopped
- The restriction of water intake was not totally lifted until November 11 (although typhoons hit Sanuki Plain in September).



Adaptation measures taken in the Sanuki Plain in 1994 drought

(1)	Traditional practices of agricultural irrigation	E.g., <i>Bansui</i> (rotational irrigation), <i>Hashiri-mizu</i> (the way of irrigation that only allows a minimum amount of water intake)
(2)	Improvement of the water facilities	E.g., installation of water pumps, pipes, wells
(3)	<i>Mizu-Yuzu</i> (water sharing) within agricultural sector	a) Intra-basin water sharing b) Inter-basin water sharing



Effectiveness of the drought adaptation measures in 1994

- Effectiveness
 - By implementing the traditional practices of agricultural water, local farmers could alleviate crop damages (Kagohashi and Ueta 2011)
 - Actually, the rice output increased by 4%
- Determinants of the success
 - Local farmers voluntarily implemented the traditional practices, some of which were revived.
 - Inter-/intra-basin water sharing
 - Subsidy for the improvement of water facilities

Comparison between Landcare and the Sanuki pond irrigation practices

Landcare principles	Sanuki Plain	Fitness
1. Local autonomous voluntary groups	Farmers in the Sanuki Plain have formed local groups which has strong autonomy, but are not voluntary (formed historically).	N/A
2. Focus on local problems	Strong focus on drought and crop damages	Very good
3. Holistic approach	Farmers adapted to the 1994 drought by implementing traditional practices and water sharing, and improving the efficiency of water facilities.	Good
4. Stress on the well-being of local communities	Crop damage would harm farmers' well-being not just on the economic aspect (i.e., income), but on the social aspect (i.e., farmers' identity, cultural value).	Very good
5. Partnership & Networking	National/Local Gov., KCLID provided support for farmers. Farmers were networked through water sharing.	Very good

What makes drought adaptation effective in the Sanuki Plain?

- Hypothesis: “**principle of subsidiarity**” matters.
- Each pond manager (irrigation association) in the Sanuki Plain has **strong autonomy**, since it has been managed for hundreds of years. KCLID or local government cannot override the decision of each pond’s water use.
- Based on the autonomy and independency of each irrigation association, KCLID and national/local government **provided resources** (inter-basin water sharing, subsidy for water facilities, etc.) **where farmers cannot adapt to the drought through their voluntary efforts**.
- We can find the subsidiarity principle in the practice of pond irrigation in the Sanuki Plain, especially in the drought period.

Conclusion

- Drought adaptation in the Sanuki Plain is rooted not only in the **autonomy of pond irrigation association**, but also in the **legal support** from KCLID and national/local government.
- We can find “Landcare principles” in the practice of drought adaptation in the Sanuki Plain.
- Through the lens of “Landcare principles”, **we might be able to relate the existing local activities in Japan to Landcare.**
- We can see the “**principle of subsidiarity**” behind the case of the Sanuki Plain, which should be **one of the determinants of social resilience.**



Landcare
Australia

everyone,
everywhere, landcare

Thank you for your attention!