Wildfire in the Western Pacific

Pacific Fire Exchange

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JOINT FIRE SCIENCE PROGRAM

The US-Affiliated Pacific Islands (US-API) encompass a wide swath of the southern and western Pacific Ocean. These tropical islands are biodiversity hotspots and home to 1.9 million people from diverse and vibrant cultures.

Many US-API, especially in the western region, are prone to wildfires which must be managed to protect the islands' communities and ecosystems.

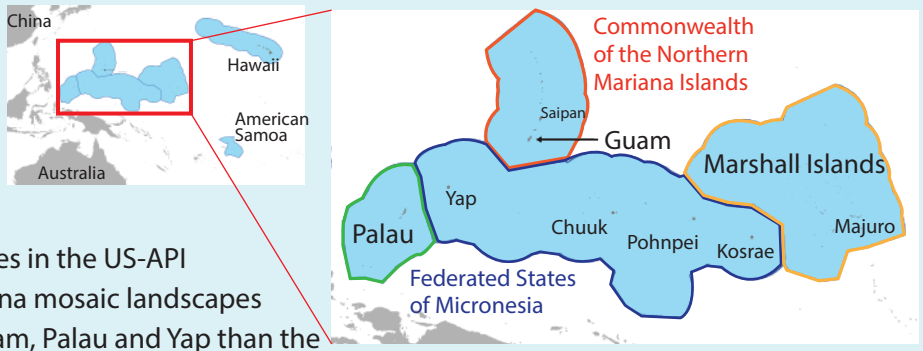

Figure 1. Map of the US-Affiliated Pacific Islands and detail of western Pacific. Courtesy of www.PacificRISA.org

Did You Know?

- Human activities cause almost all fires in the US-API
- Fire maintains complex forest-savanna mosaic landscapes
- Fire burns a larger proportion of Guam, Palau and Yap than the Western Continental US in some years

Drivers of Wildfire

Ignition Sources

Volcanic Events - No, volcanic activity on inhabited islands ended over 1 million years ago.[1,2]

Lightning Strikes - Rare on Pacific Islands

People - Yes! Fire served as Pacific Islanders' primary agricultural tool and they likely started burning vegetation as soon as they colonized the region between 3,000 to 4,000 years ago.[3] Intentional burning continues on many islands today. Ignitions are associated with, though not limited to, agricultural activities, hunting, and juvenile fire starts.

Climate

Abundant rainfall (77-150 in/yr or 196-381 cm/yr) and warm temperatures across the western Pacific allow for ample vegetation growth and fuels accumulation. For this region,

the seasonal and year-to-year variability of rainfall has the largest influence on wildland fire.

Potential for wildland fire greatly increases under dry conditions, especially in savannas where fine fuels cure and ignite easily. Islands in the far west experience distinct dry seasons each year due the the Asia-Pacific Monsoon (Fig. 2).

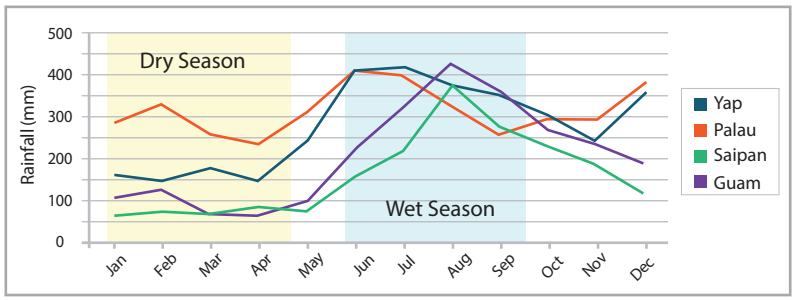

Figure 2. Rainfall on western Pacific islands shows distinct wet and dry seasons. Thirty-year average rainfall data from Western Regional Climate Center.

El Niño events typically result in severe drought across the entire Western Pacific. These drought events can significantly increase the area burned by wildland fires even on very wet islands like Pohnpei in the Federated States of Micronesia.

Fuels & Vegetation

Some of the most interesting vegetation features found on larger western Pacific islands are the dramatic landscape mosaics composed of open savanna and closed forest (Fig. 3).

Figure 3. A patchwork of savanna and forest stretches across Yap's landscape.

Most researchers agree that this patchwork vegetation pattern is the result of long-term, recurrent burning by people.[4,5] The savannas occupy a significant percentage (e.g. 10-20%) of many islands' land area and are dominated by native grasses and ferns, with scattered shrubs and trees.

Native Savanna Plants

Sword Grass - *Miscanthus floridulus*

False Staghorn Fern - *Dicranopteris linearis*

Pandanus - *Pandanus tectorius*

The abundance and continuity of fine fuels in the savannas allows fires to ignite easily and carry across large distances. In addition, nonnative, fire-adapted grasses and shrubs, like mission, guinea and imperata grass, as well as Siam weed and false (haole) koa are established on many islands and may also influence fire occurrence.[6]

A Closer Look

Local Fire Histories

Scientific interest in wildland fire on Pacific Islands is growing but there are only limited fire records for the region. At present, the best available data for the western Pacific is from Guam and Palau (Fig. 4). These records indicate that fires are frequent and extensive, affecting a significant proportion of the land area on an annual basis.[7] These records also indicate that the land area burned annually increases during severe El Niño events.

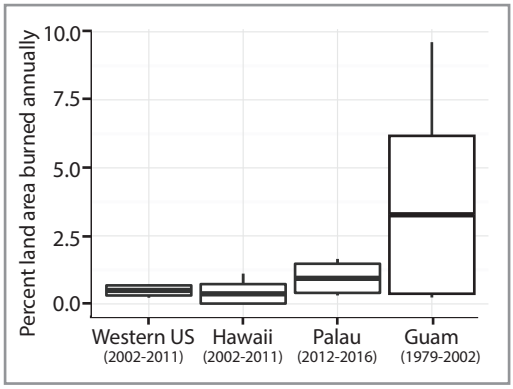

Figure 4. A comparison of percent area burned annually. Mean, standard deviation, and maximum and minimum represented by bar, box, and whiskers, respectively.

Impacts

Fire suppression resources are extremely limited compared to Hawaii and the mainland US, and wildfires frequently expose human lives and communities to danger.

Due to the small land areas on western Pacific Islands, **wildland fire impacts** on natural resources **can be particularly acute.**

Figure 6. Community of Humåtak on Guam, with savanna in background.

Figure 5. Severe erosion in a Palau savanna.

Frequent fires in savanna vegetation expose forest edges to fire damage, which can be severe during droughts. Fire also increases erosion and sediment run-off to nearshore coral reefs. On Guam, erosion rates in burned savanna were at least twice that of adjacent, unburned savanna.[8] The frequency and extent of fires as well as the proximity of fire-prone watersheds to coral reefs highlights the need to integrate fire management into effective coastal resource management.

Moving Forward

Mitigation Efforts

Pre-Fire: Multiple tree-planting projects on Guam, Yap, and Palau aim to reduce the abundance and continuity of fine fuels that drive fires in savannas. Community outreach programs on these islands also seek to address the social aspects of fire occurrence.

Suppression: Local fire agencies respond to wildfires with limited resources but continue to build capacity with support from USDA Forest Service Fire and Aviation Management.

Post Fire: Recent community-based work on Guam demonstrated that tree planting and sediment traps can reduce sediment delivery to coral reefs.[9]

Seeking New Insights

Ongoing projects by several federal and local collaborators to map fires in Guam, Yap and Palau will increase public awareness and our understanding of fire dynamics for those islands and the region as a whole. In addition to this data, research on islanders' uses and cultural perspectives of fire could help managers to work more effectively with communities in reducing negative fire impacts.

Research Needs

- Fire histories
- Fire & vegetation change
- Cultural uses & perceptions of fire
- Balancing agriculture & hunting practices with natural resource protection

Collaborators

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