

Prevention of Forest Fires in the Wildland Urban Interface

Good Practice Guide
for the Community



Asia-Pacific
Economic Cooperation



APEC

APEC Project: EPWG 05 2021A

Produced by
Regional Ministerial Secretariat for the Environment with the collaboration of
The National Service for Disaster Prevention and Response,
Valparaíso Region, Chile.

For
Asia Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

Copyright © 2023 APEC Secretariat

APEC#223-EM-03.3



Introduction

The threat of wildfires is on the rise throughout the Asian-Pacific Economic Cooperation (APEC) region.

Many economies are experiencing more frequent and intense wildfires, drier conditions, and longer fire seasons. Climate change and the expansion of human settlements into forested areas are among the many factors leading to this rise.

The United Nations Environmental Programme predicts that the **number of wildfires will increase by 50%** by the year 2100. The cost of suppressing wildfires is also increasing. Economies, such as Canada and the United States of America, have experienced an increase to over \$1 billion annually over the past six years in suppressing wildfires.

A concerted effort at all levels of government, from the economy-level to the community-level, is required in order to reduce the threat of wildfires. Each community is unique; the infrastructure, urban development patterns, plant and animal life, and other cultural and socioeconomic characteristics blend to make it more or less vulnerable to wildfires. Community-level planning is required to truly represent these characteristics and ensure that local populations are as protected as possible.

This guide seeks to provide community-level planners with simple, cost-effective, and proven good practices that can be applied at the local level to prevent wildfires.

Terminology

Experts in the field of wildfire management will note that there is a distinction to be made between the terms of “wildfire” and “forest fire”.

Forest Fire*

“Forest Fire” can be described as an unenclosed and freely spreading combustion (fire) that consumes the natural fuels of a forest taller than two meters.

Wildfire**

“Wildfire” can be described as an unenclosed and freely spreading combustion (fire) that consumes the natural fuels of an area (i.e., grass, weeds, shrubs, trees, etc.).

Though the two terms are frequently used interchangeably, the term wildfire has more wider ranging applicability. Therefore, the authors of this guide have chosen to use the term “wildfire” when discussing the destructive fires that are threatening the APEC economies.

Wildland-Urban Interface (WUI)

An additional term of note is “Wildland-Urban Interface”. This is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The most destructive wildfires are often those that involve this line of development where human infrastructure meets the wildland.

* <https://www.britannica.com/science/forestry/Fire-prevention-and-control>

** <https://www.britannica.com/science/wildfire>

Developing a Community Wildfire Prevention Plan

Creating a comprehensive wildfire protection plan is one of the most important steps a community can take to recognizing and addressing its risk for wildfires. The following are steps to creating a community wildfire protection plan.

Step 1

Develop a planning team

Step 2

**Evaluate the natural environment
of the community**

Step 3

Assess risk

Step 4

Identify assets at risk

Step 5

Create an action plan

Wildfire Prevention Plan

STEP 1

Develop a planning team

Effective planning begins with developing a team. Forming a team out of partners who have an interest or a responsibility in managing forests or combating forest fires will help to broaden the knowledge and expertise, as well as ensure the problem is being evaluated from different perspectives. Examples of stakeholders to invite into the planning team include: those who provide emergency services (such as fire and police services), those who manage critical infrastructures (such as power, cellular services, water, schools), those responsible for forest land management, conservation groups, and groups that advocate for historically vulnerable populations (such as the elderly, women, children, the homeless, etc.).

There should be a **core planning team** which is responsible for managing the process and developing the action plan; as well as a **consultative working group** consisting of the representatives of the larger community.

STEP 2

Evaluate the natural environment of the community

The forested or undeveloped areas around the community should be evaluated to determine the local weather, topography, density, state of growth, amount of unmaintained dead leaves and branches, health of the vegetation, presence of invasive species, and other aspects that will help to determine how likely the land is to catch fire. This step requires consultation with forestry experts, such as those in community or economy-level forest management offices, qualified conservation groups, or other academic specialists.

STEP 3

Assess risk

Risk is the combination of the probability of an event occurring and its negative consequences from a **hazard**, in this case a wildfire. No two communities are the same, therefore the risk is not the same between communities. Additionally, risk may be higher in differing areas within a single community. Assessing risk includes identifying **vulnerabilities**, which are those aspects that make an area or its people susceptible to the hazard; and evaluating

the anticipated **exposure**, or losses from the hazard occurring. In short, assessing risk seeks to predict the potential losses that a disaster would cause in terms of lives, health conditions, livelihoods, goods and services, and that could occur in a particular community or society in a specified period of time in the future¹.

By identifying these vulnerabilities, community planners can make more informed decisions regarding the focus of forestry efforts, placement of early warning systems, emergency and evacuation planning, and expenditure of limited financial resources.

Factors to consider when assessing risk include:

- Weather and climate
- Land management practices in the community
- Forest structure, conditions, and topography
- Fuel load, such as type of trees, density, etc.
- People in the area (including aspects such as: elderly populations, languages used, socioeconomic status, presence of unregulated camps, ownership of houses, cooperation with local authorities, disabled populations, population fluctuations such as seasonal tourism, and reliance of population on mass transit).

Partnering with academic institutions, private sector, and non-governmental organizations



Risk is the correlation between Hazard, Vulnerability, and Exposure

¹ UNDRR: https://www.unisdr.org/files/7817_UNISDRTerminologySpanish.pdf

will prove invaluable throughout this planning process, but especially in assessing risk. These entities may have access to knowledge and resources, such as risk mapping, geospatial information systems, artificial intelligence, unmanned aerial vehicles, satellite imagery, and a wide range of other very useful technologies to enhance the risk assessment process.

There should be a **core planning team** which is responsible for managing the process and developing the action plan; as well as a **consultative working group** consisting of the representatives of the larger community.



STEP 4

Identify assets at risk

During this step, the planning team will seek to identify what is threatened by wildfire. This is where risk-mapping, satellite imagery, and technologies will be instrumental. Assets will include people, homes, businesses, farms, critical infrastructure, houses of worship, cultural and historical sites, endangered animals, or other items the planning team deems to be valuable.

As assets are identified, it is helpful to begin considering what characteristics make this asset at risk of catching fire during a wildfire and what can be done to reduce that risk.

Example:

ASSET	POWERLINES
Source of Ignition	Contact with overgrown tree limbs
Reduction Action	Trim tree limbs within five meters

STEP 5

Create an action plan

Once the potential vulnerabilities have been identified in Steps Two through Four, an action plan should be developed. This plan should outline the short-term and long-term actions that are intended to reduce the overall risk of wildfires in the community.

These actions should include:

- Legislation or policies that need to be created and implemented
- Land use planning regulations, building codes, and other restrictions to be addressed by community laws or decrees
- Early warning systems
- Preventive forestry actions
- Creating defensible space around structures
- Structural mitigation actions
- Community education and outreach programs

Actions should be divided into those that need to be implemented immediately to address potential life safety issues or those actions that are simple enough to accomplish in the short-term, and those activities that would require more long-term approach for successful application.

Good Practice Actions to Consider

Since no two communities are the same, it may be impractical to create an exhaustive list of all actions necessary to reduce wildfire risk. Instead, what follows are good practices to consider when evaluating risk and developing short- and long-term action items to undertake.

Legislation and policy frameworks

Create community level legislation or policies to govern how wildfire risk reduction will be accomplished. Examples of items to include in legislation and policies include:

- Statement of the community's commitment to risk reduction of wildfires
- Budgeting for wildfire prevention
- Clear definition of roles and responsibilities for fire prevention of community stakeholders
- Requirements for repeating risk assessment periodically (such as every three years and after major wildfires)

Land use planning regulations, building codes, and other restrictions

The development of human structures in the community needs regulations in order to reduce risk. Land use planning specialists should be included in the core planning team for the community. These may be found in local or economy-level forestry management or disaster management offices. Examples of land use planning or other regulations to consider include:

- Restriction or prohibition of new construction in high-risk areas
- Requirements for access routes and fire lanes for emergency vehicles and evacuations
- Access to non-potable sources of water for fire suppression
- Permitting for agricultural, garbage, or commercial burnings and restricting these during peak-fire conditions

- Standardizing protective distances to be maintained between homes, buildings, or infrastructure from forested or undeveloped land

When developing these regulations, it is crucial to also provide for the enforcement and consequences (such as fines) for failing to comply.

Early warning systems

A system must be created and maintained to warn and inform the public before, during, and after a wildfire. Multi-layered approaches to public information and warning work best as different subsets within a community receive and consume information differently. Examples of early warning systems include:

- Sirens or Public Address Systems
- SMS/Text messaging
- Apps for smart phones
- Social media posts
- Automated telephone systems
- Television / radio

Implementation of a successful early warning system will require technical assistance, public education, and funding. Non-governmental organizations can serve as excellent partners in this process.

Additional points to consider when developing an early warning system:

- The public needs to be educated on the method(s) to be used to inform them and what actions they should take when warning is received.

- Different groups, such as the elderly or teens/young adults, receive information differently. Include identifying the best methods for reaching all groups as an action item during the community consultative in the development of the community prevention plan.
- Systems need to be sustainable over time, this will require training, funding, and maintenance.
- Information needs to be easily understood by the public including reaching them in common languages spoken in the community.
- Existing early warning systems for other hazards could be leveraged to support warning for wildfires.
- Early warning systems need to be tested routinely to ensure effectiveness. Include the public in tests and drills for the warning system to help measure if they are receiving the warning and if they know what they are expected to do in response to such warnings.

Preventive forestry

Preventive forestry is the preservation or improvement of a forest and control of damage by natural and man-made causes, such as fires, plant pests, and adverse climate conditions. By requiring or advocating for proper management of forests and landscaping, communities can limit sources of ignition and fuels that would otherwise help fires grow.

Examples of highly effective preventive forestry actions include:

- Eliminating combustible waste through pruning, removal, or controlled burning.
- Incorporating firebreaks into forests by cutting strips through dense forestry that are at least 3 m wide to slow the spread of flames.

- Clearing a distance of 10 m from the roadside and 5 m from electrical lines to build separation between combustible vegetation and sources of ignition, such as contact with electrical lines or discarded cigarettes from passing automobiles.
- Incorporate fire lanes into dense forests to assist firefighters with gaining access to hard-to-reach areas.
- Instituting annual maintenance of firebreaks and fire lanes to ensure these are not overgrown.
- Work with forestry experts to incorporate "green firebreaks" by diversifying the species of vegetation in the forest through the planting of fire resistant plants and trees.
- Assess vegetation in high-risk areas for signs of illness or pests, as healthy vegetation is more resistant to flames.
- Create more open space parks with lower density of trees in communities of high fire risk.
- Encourage or require property owners to take proactive measures to create defensible space around homes and other structures in high-risk areas.
- Ensure machinery is in good working order, particularly looking for building up of vegetation around moving parts, exhaust system free of holes and fitted with spark arrestors.



Image 1 Defensible space saved this particular home in Nebraska, USA two years in a row. (Photo Credit: Andrew Avantagiato)

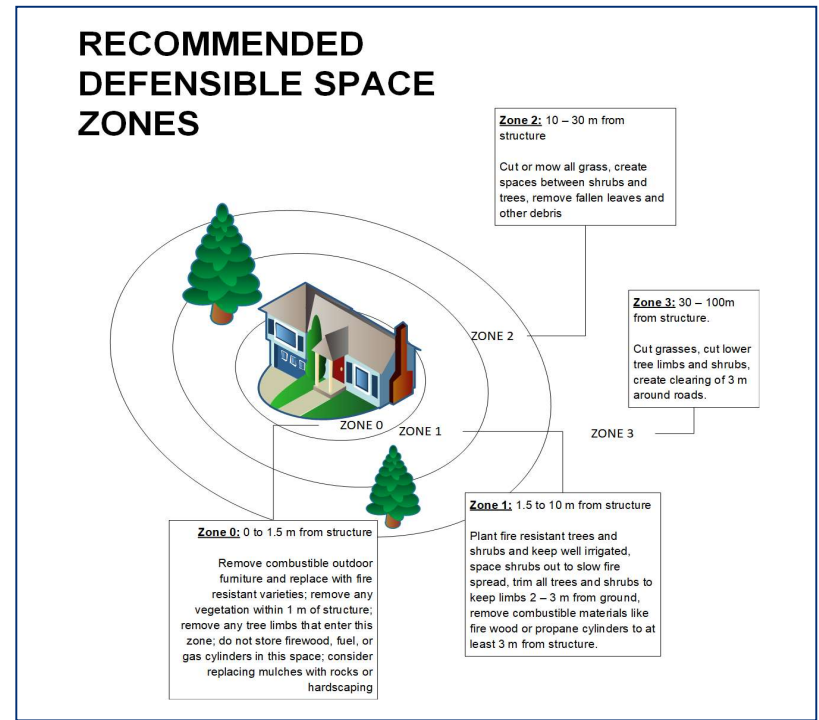


Image 2 Examples of recommended actions to take based on Defensible Space Zones

Creating defensible space around structures

Defensible space is an approach by which property owners create levels of defense around homes and other buildings by properly managing landscape and the flammable materials stored around the structures. **Image 2** provides examples of recommended actions to take based on these layers of defensible space.

Structural mitigation actions

As mentioned previously with land use planning and building codes, establishing requirements for the materials new construction must use helps to reduce the amount of combustible materials available. However, these new regulations often do not

apply to existing structures. Instead, it will be important to educate property owners on structural measures they can implement to reduce fire risk.

Such structural mitigation measures include:

- Cover open spaces around the roof or eaves to prevent birds from building nests. Remove any nests from within these spaces.
- Install fire resistant covers on gutters and drains around roof.
- Inspect roof, windows, wooden fences, decking, and exterior siding of the structure for signs of rot. Replace any damaged boards with fire resistant material.

- When it is time to replace windows, replace them with multi-paned windows with at least one pane of tempered glass.
- When it is time to replace roofs, siding or decking, use non-combustible materials.
- Replace grass or mulch around the structure with gravel ground cover.
- Cover chimney or stovepipe with fire resistant screens.
- Close fireplace flue during fire season when chimney is not in use.
- Consider replacing wooden fences with a fire-resistant style, or at least a section of fire-resistant material for 2-3 m where the fence attaches to the structure.

Community education and outreach programs

In order to be successful, community prevention programs must incorporate education and outreach to the public. Empowering the property owners to take proactive action to protect property and educating the public on how to prepare themselves, communities will have a greater level of resilience against the threat of wildfires.

Additionally, volunteers from within the community could be organized into supporting roles to conduct risk reduction measures, such as clearing of overgrown forests, installation of smoke detectors, or educating others on preparedness.

Educational topics for the public should include:

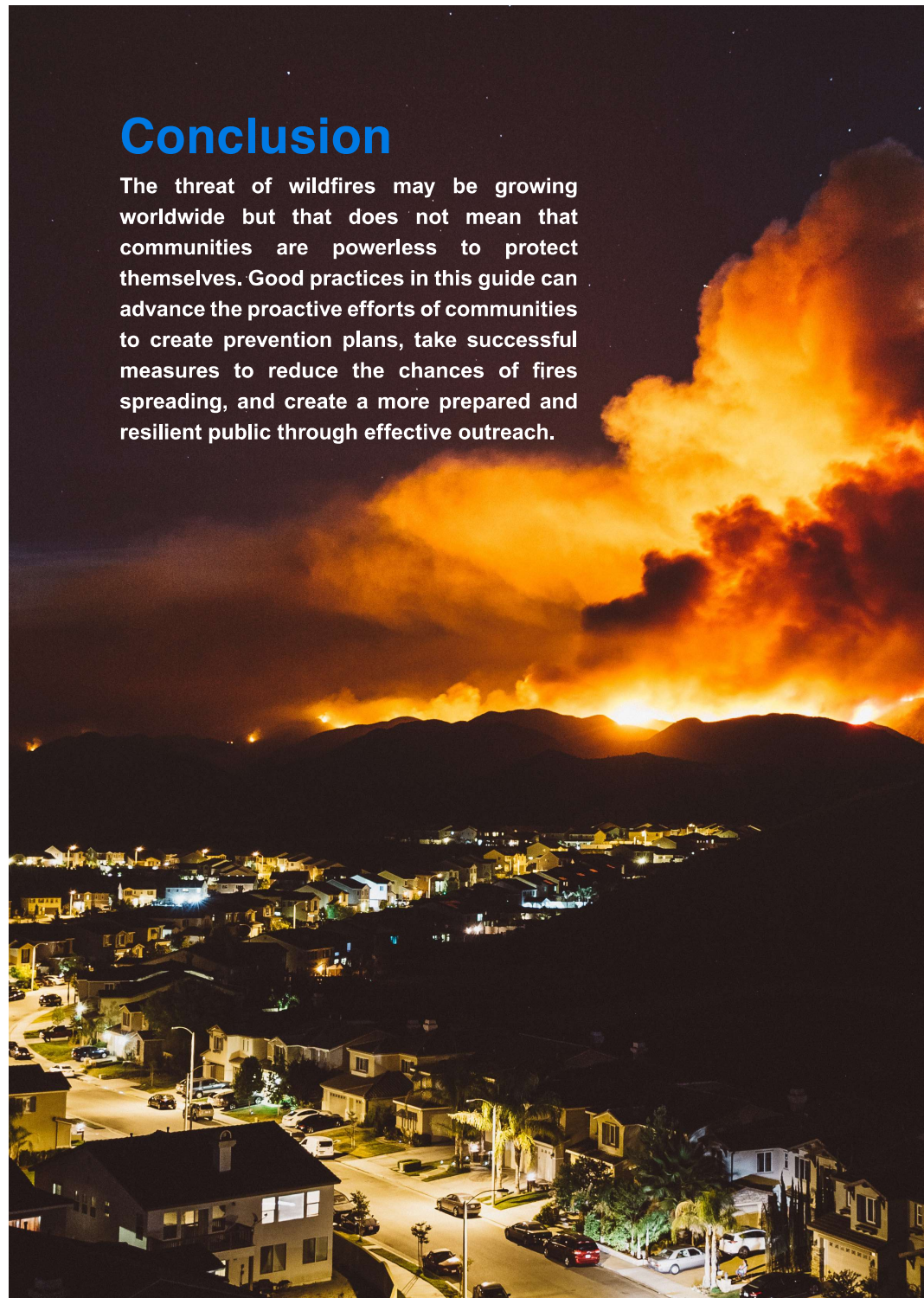
- Defensible space techniques and structural mitigation for property owners
- Early warning systems and what to do in the event of an alert
- Creating family emergency plans and preparedness kits
- Behaviors that contribute to the spread of wildfires

- Good practices to enhance the success of community outreach and education programs include:
- Develop core-messages that are reliable, offer attainable solutions, and whose impacts can be measured. Messaging should be consistent but customizable to reach local populations, education levels, languages, etc.
- Create and support recognition programs that target and highlight individual citizens, neighborhoods, and community successes.
- Engage economy-level wildfire stakeholders to develop the education campaign targeted toward at-risk communities.
- Develop campaign objectives that are clear and measurable.
- Identify community influencers who can be used to spread the information.
- Establish metrics to measure the success of the campaign.
- Identify high-risk communities in which to begin the campaign.
- Leverage both traditional and social media opportunities.
- Work with community advocacy groups who represent historically vulnerable populations, including women, children, the elderly, those who identify within the LGBTQIA+ community, the homeless, or others in order to ensure that action plans do not inadvertently place these groups at a higher disadvantage.

- Engage indigenous communities in the area to not only educate them, but to learn from them. Incorporate this existing knowledge with current technology for more effective approaches to fire prevention.

Conclusion

The threat of wildfires may be growing worldwide but that does not mean that communities are powerless to protect themselves. Good practices in this guide can advance the proactive efforts of communities to create prevention plans, take successful measures to reduce the chances of fires spreading, and create a more prepared and resilient public through effective outreach.





**Asia-Pacific
Economic Cooperation**

APEC Secretariat

35 Heng Mui Keng Terrace, Singapore 119616

Telephone Number: (65) 6891 9600 • Facsimile Number: (65) 6891 9419

Website: www.apec.org

Email: info@apec.org

Copyright © 2023 APEC Secretariat