

Fire in the Earth System: Science & Society

Wildfires as Ecosystem Services



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Sofia 9/10/2019

Fire paradigms

Take home message: we need to consider both views

Outline

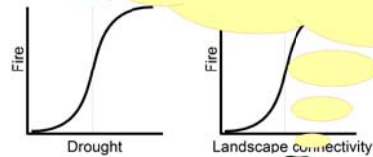
- A Wildfires current drivers
- B Wildfires in history
- C Wildfires and plants (traits)
- D Wildfires for humans (benefits)



Welcome to a changing world!

- Climate warming
- Fuel accumulation
- New wildfire regimes
- +WUI, +ignitions

Business-as-usual is not working!
What can we learn by looking through other glasses?
What are really wildfires?
There must be another view!



Megafires, Gigafires

Fire spread rates beyond the extinction capacity

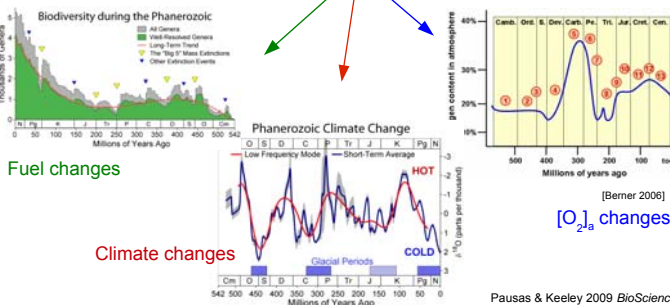
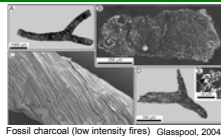


Hurricane Ophelia, Oct 2017

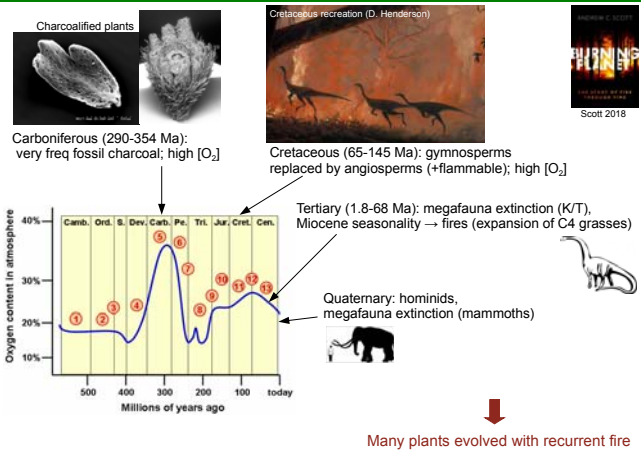
Fire drivers through time

- Ignitions: Lightning, volcanoes
- Oxygen: Plants
- Fuel: terrestrial plants

Silurian (444 - 416 Ma)



Fire history

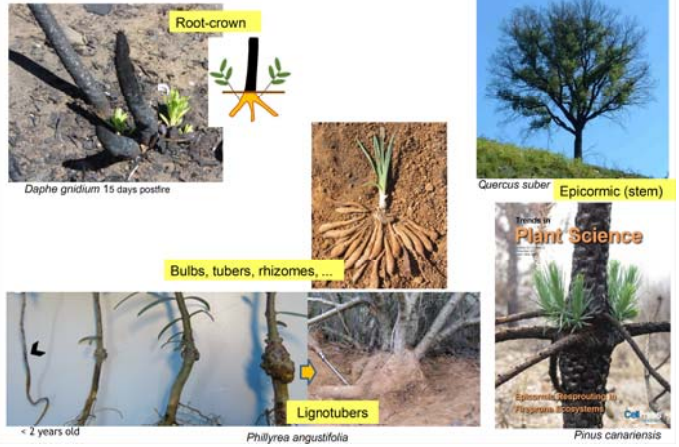


C

Fire and adaptive traits

How plants survived and reproduced under recurrent fires?

1. Resprouting postfire



2. Thick bark

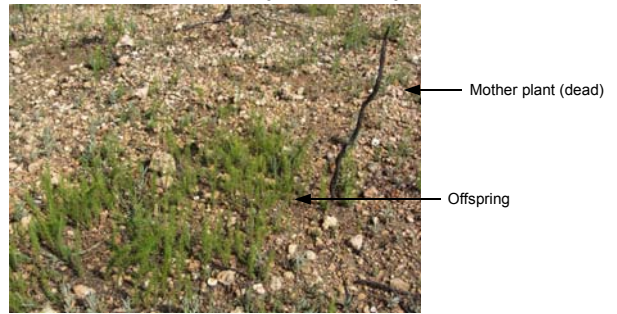


- Good insulator
- Survival
- Low-intensity (surface) fires
- Epicormic resprouters and in non-resprouters

Pausas 2015, Bark thickness and fire regime, *Funt Ecol.* 29

3. Seed bank (storage) & postfire germination

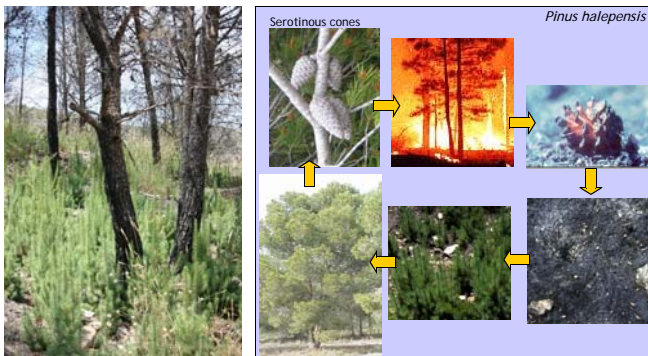
3a. Soil storage, fire-stimulated germination



Ulex parviflorus, 1 yr postfire

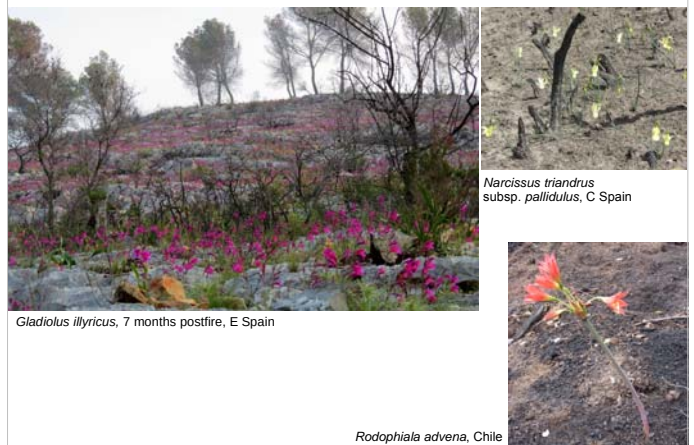
3. Seed bank (storage) & postfire germination

3b. Canopy storage (**serotiny**), fire-stimulated seed release



Well adapted to high intensity crown-fires

4. Fire-stimulated flowering



5. Flammability

Variability in the ability to start and to spread a fire

The case of pine



Pinus halepensis

Branch retention
Serotiny
Crown fires



Pinus nigra

Self-pruning
Thick bark
Surface fires

Pausas et al. 2017 J. Ecol.; Pausas 2015, Trends Pl. Ecol.

Therefore

- Wildfires has been on Earth for long and have been recurrent enough to have shaped many plants; and our biodiversity
- A world without wildfires would be less diverse

What benefits wildfires provide to humankind?

CA18135 - Fire in the Earth System: Science & Society (FireLinks)

D

Ecosystem Service (ES)

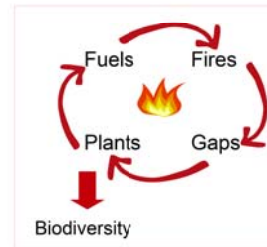
Millenium Ecosystem Assessment 2005



Ecosystem Services: supporting

Supporting services: those necessary for the production of all other ES

Fires open gaps



Australian bustard

Provisional
Regulating
Cultural

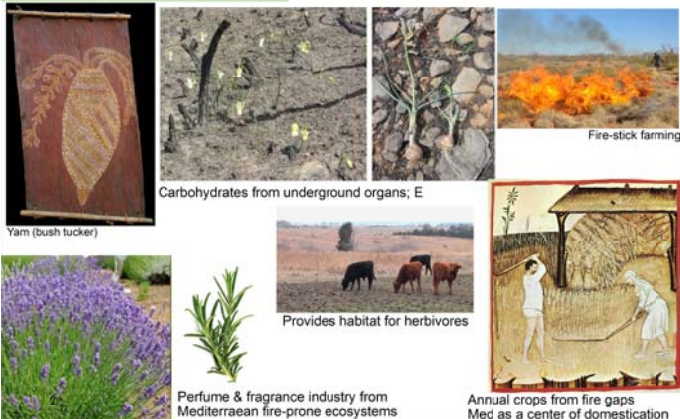
Services:

- Early, rural, indigenous societies (E)
- Contemporary western societies (C)

Pausas & Keeley 2019, Front. Ecol. Envir.

Ecosystem Services: provisioning

Provisioning services: products



Ecosystem Services: regulating

Regulating services: regulation of ecosystem processes



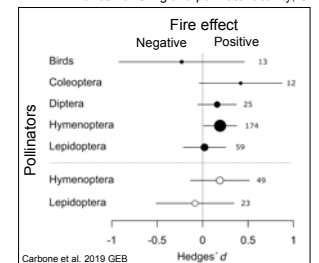
Pest control, humans, livestock, wildlife; E,C



Enhance flowering and pollinator activity; C



Reduce catastrophic wildfires; E, C



Ecosystem Services: cultural



Cultural services: non-material benefits



Fire Dreaming, by Malcolm Maloney Jagamarra, www.aboriginalartcoop.com.au

Spiritual, inspiration; E



Ecotourism, recreational hunting in open spaces; C



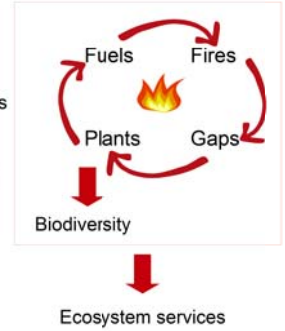
Knowledge on ancestral fire management techniques; C

Wildfires as an ecosystem service

Wildfires

- Open gaps
- Provide novel opportunities
- Generate heterogeneity, variety of habitats
- Generate plant trait variability: diversity
- Provide a range of services to humankind

We need to recognize these facts if we aim for a sustainable management

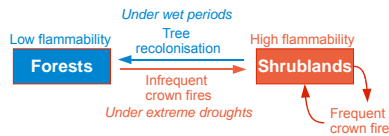


Pausas & Keeley 2019, *Front. Ecol. Environ.*

Questions for FireLinks



- Wildfires burn plants: where are the plant ecologist in FireLink?
- Fires in non-fire-adapted ecosystems? Loss of resilience?
- Can we maintain biodiversity, ecosystem processes and services?
- What are the sustainable fire regimes for each ecosystem?
- How can we shape fire regimes to be sustainable?
- At least, could we (WG2?) document, map, quantify changes?
 - Ecosystem state shifts? Resilience?
 - Biodiversity losses?



Благодаря ти много!

Floods don't make the rainfall bad
Overgrazing don't make herbivores bad
and Megafires don't make wildfires bad!



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