

Current activities and future challenges in preventing forest damage due to extreme weather events

FOREXCLIM Workshop
Ljubljana; 25.4.2018

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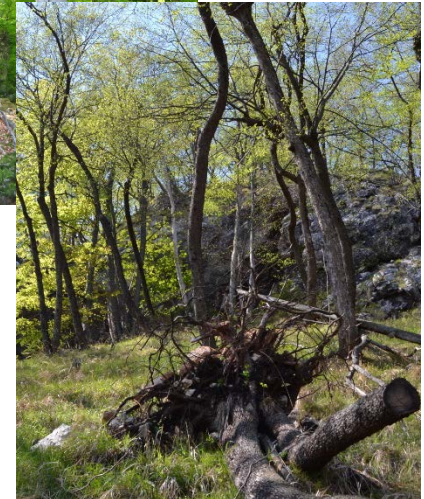
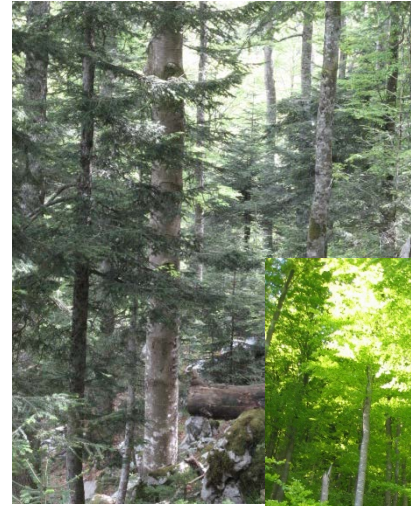
Climate changes and its impact to forest

- changed magnitude, frequency and type of disturbances in last decades
- in last four years three catastrophic events:
 - ice break in February 2014 destroyed 9,0 mio. m³ of wood
 - bark beetle outbreak destroyed 6,4 mio. m³ of wood
 - wind throw in December 2017 destroyed 2,2 mio. m³ of wood



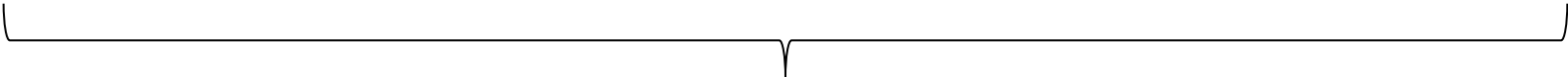
Climate changes and its impact to forest

- changes in site conditions
- distribution of tree species, forest stand structure
- rapid spread of invasive alien species & other harmful organisms



Adaptation of forest management is a response to climate change impacts on forests

- to maintain prosperity and community development
- adjustments to forest strategies and changes to forest management plans and practices.
- delays in taking action will increase forest degradation, cost and difficulty in providing ESS



Sustainable close to nature forest management is an effective framework for climate change response

Planning of adaptation measures in forest management



Impact of climate change on forests

Regional variation in forests

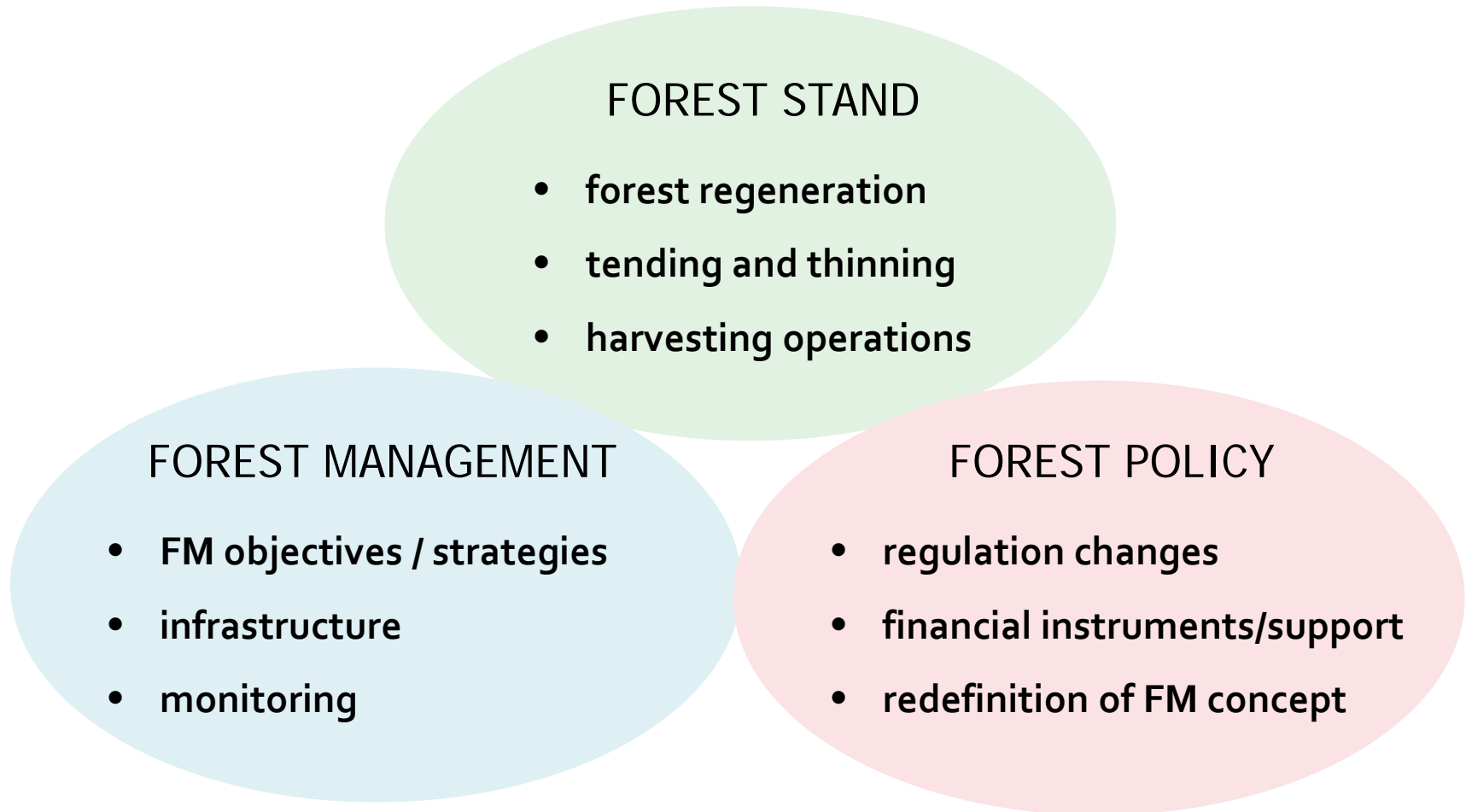
Possible adaptation measures

Policies to support of adaptive forest management

Informing and education of forest managers

Adaptation to climate change in forest management

Adaptation strategies should be developed at different levels



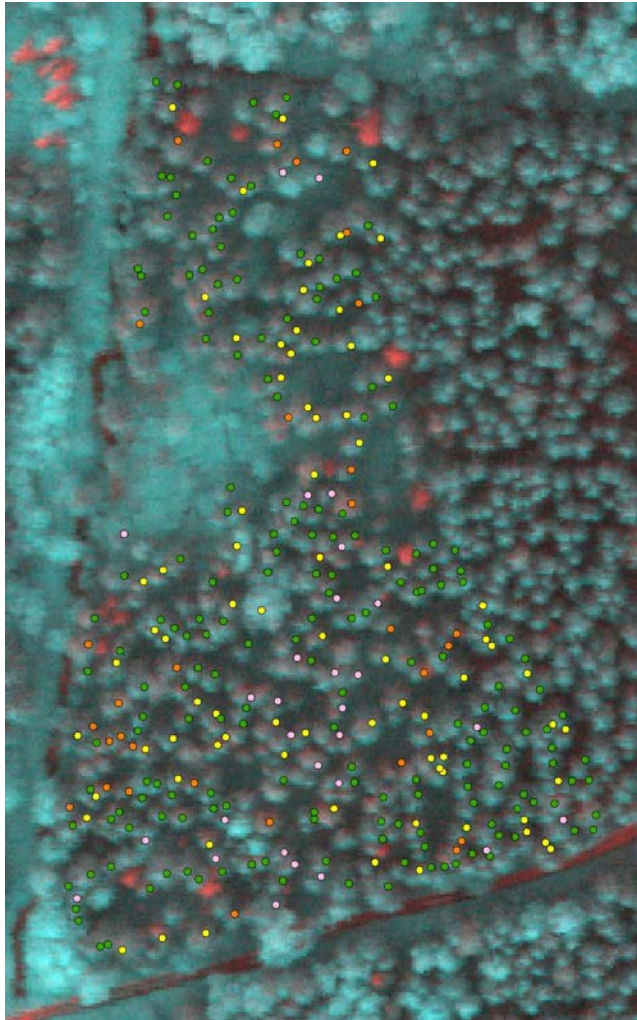
Adaptation measures for minimizing the impacts of disturbances

Extreme weather events (wind-throw, ice & snow-breaks):

- fast removal of damaged wood (prevention of secondary disturbances)
- improve resistance of stand structure (thinning)
- reduce the size of cutting areas
(mosaic stand structure)
- implement forest edge management
- decide on forest rotation period
(e.g. old forests are more sensitive to strong winds)
- tree species composition (appropriate mixture of species adopted on changed site conditions)



Adaptation measures for minimizing the impacts of disturbances



PESTS AND PATHOGENS:

- monitoring of pests and diseases
- establishing monitoring networks
- use of early detection and warning systems



Adaptation measures for minimizing the impacts of disturbances

PESTS AND PATHOGENS:

- prophylactic and adaptive measures to decrease the risk of certain pests and diseases:
 - increase of forest biodiversity (species and genetic)
 - select tree species and provenances adapted to given site conditions and less vulnerable to biotic disturbance
 - implementation of sanitation measures (e.g. removal of logging residues)



Adaptation measures for minimizing the impacts of disturbances

BARK BEETLE outbreaks:

- strict implementation of sanitation measures (e.g. removal of logging residuals, already infested trees) & monitoring of bark beetle population
- removal of damaged trees or trees with reduced vitality during regular management (tree health status is an important selection criteria)
- creation of mixt and diverse stand structure
- changing spruce with conifer species adopted to changed site conditions
- promote spruce on low risk sites and avoid (over)maturity of spruce stands
- avoid and monitor forest locations of high solar irradiation and increased temperature conditions (e.g. gaps, stand edges)

Adaptation measures for minimizing the impacts of disturbances

DROUGHT:

- select drought tolerant tree species, provenances or genotypes
- shorten rotation; final felling at younger age
- reduce stand density to reduce competition for water
- explore soil water capacity and its changes due to climate change



Adaptation measures for minimizing the impacts of disturbances



Sistem zgodnjega obveščanja in hitrega
odzivanja na invazivne tujerodne vrste v gozdu

– Priročnik za udeležence usposabljanj –



INVASIVE ALIEN SPECIES:

- early detection and warning system
- risk assessment - response and control plans
- INVAZIVKE app for mobile phones
- control and removal
- awareness raising and mobilization

Adaptation measures for minimizing the impacts of disturbances

FIRE:

- reduce fuel accumulation with suitable thinning methods
- use prescribed burning to reduce the fuel
- select tree species which are less sensitive to fire
- preparation of prevention plans
- more networking with a broad range of actors
- raising of fire risk awareness



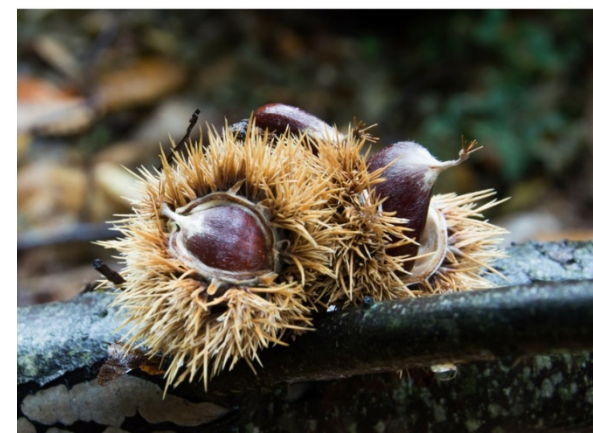
Forest owners and practitioners awareness



- real adaptation to climate change occurs at the local level and by local actors in the forest
- policy support, resources for education, training for & dissemination of knowledge to forest practitioners are needed.
- continuous challenge to provide scientific knowledge transfer to the local managers and policy makers
- awareness of forest owners and practitioners improve the implementation of adaptation measures.

Some challenges for science and forest practice

- studying changes in site conditions and adaptation ability of trees species
- monitoring and mapping of soil types (soil water capacity, soil compaction and erosion)
- growth potential of non native tree species and genetically modified species
- monitoring of genetic diversity of forest species populations
- monitoring the effect of silvicultural and protected measures
- increasing the use of modern remote sensing technologies



Thank you for your attention

