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Understanding local climate resilience and disaster risk management

Antti Mäkelä

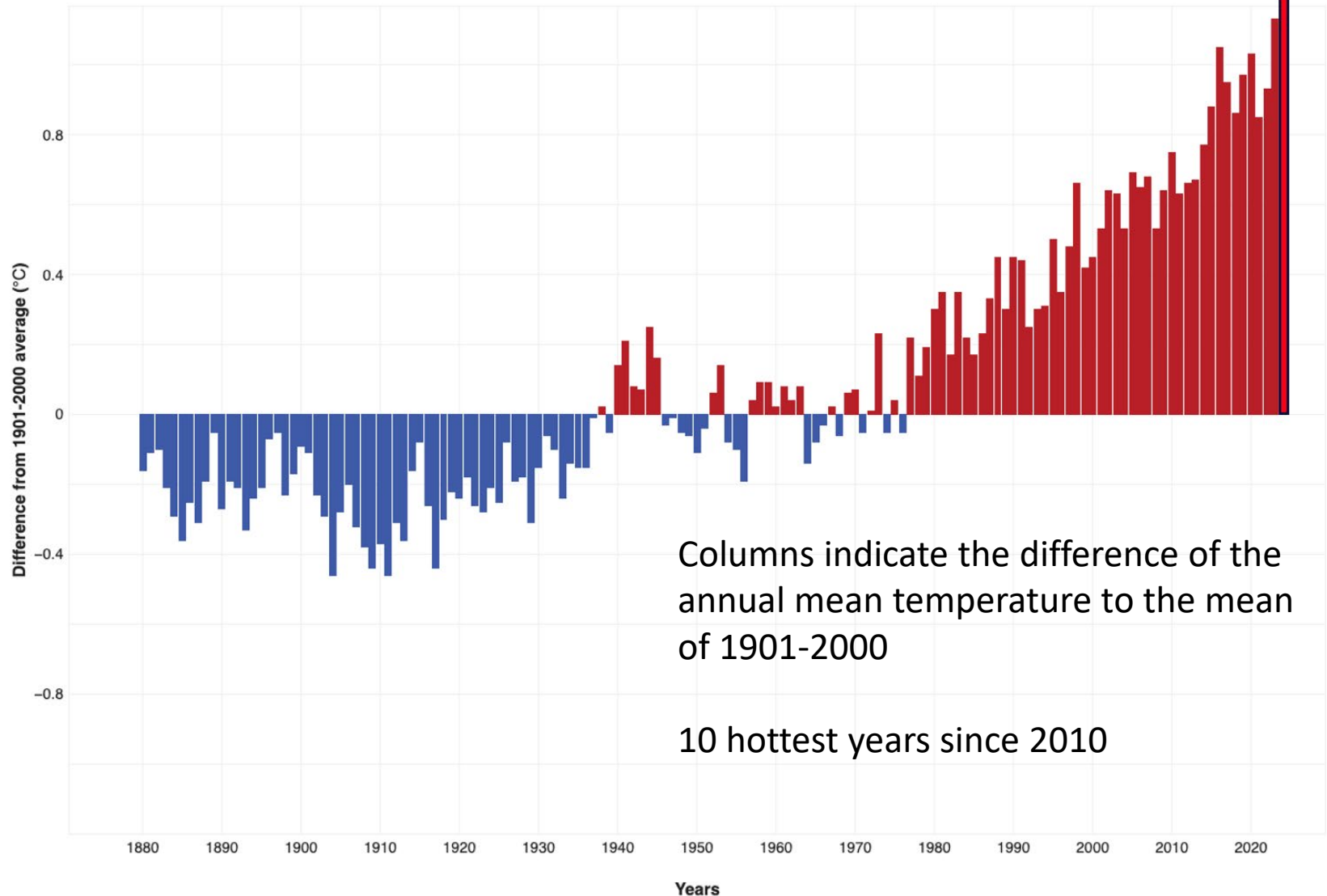
+ material from FMI colleagues

Finnish Meteorological Institute



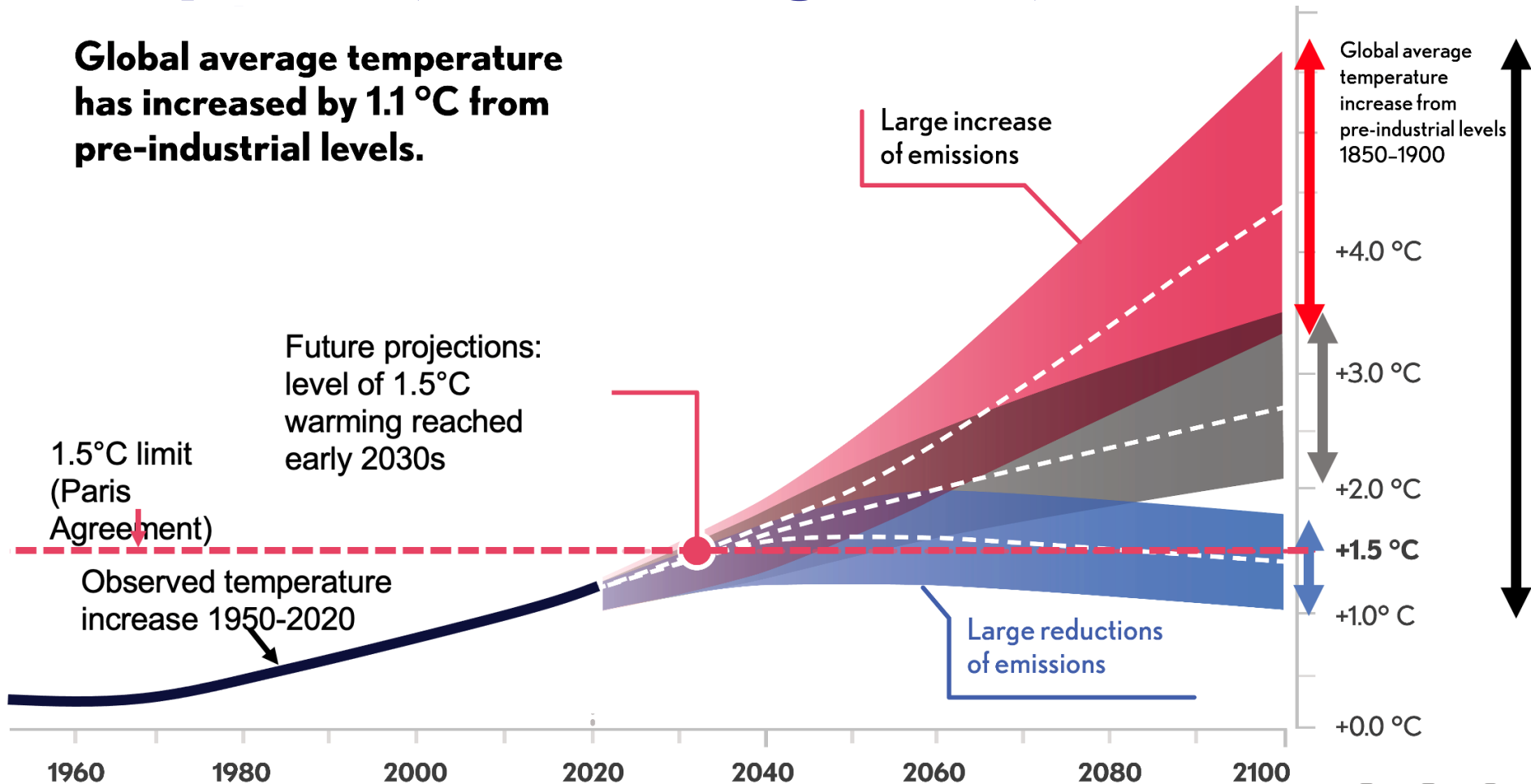
Climate has changed...

GLOBAL AVERAGE SURFACE TEMPERATURE



...and will change further (more or less) → adaptation, risk management, resilience

Global average temperature has increased by 1.1 °C from pre-industrial levels.



Based on IPCC's Sixth Assessment Report, Working Group I. © FMI and Ministry of the Environment, 2021. Climateguide.fi



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Definition

- Climate resilience
 - refers to the ability of e.g. a society or business to anticipate, prepare for, and respond to the impacts of climate change
 - involves understanding climate-related risks and vulnerabilities and implementing measures to manage them effectively
 - building the capacity to cope with, adapt to, and recover from climate-related events.
- So, climate has changed and there is no going back soon, which suggests the adaptation to new climate and extremes
 - How to approach this?



1. What are the relevant phenomena for me?
2. How does climate change impact there phenomena?
3. Do these changes need some actions from me?



Example - cities

- Cities (urban areas) are complex environments that boost many extreme weather impacts
 - urban floods, urban heat island, poor air quality, ...
- Climate change makes some of these events more frequent and/or more intense
- The cities in Finland have climate change adaptation and risk management highlighted in their strategic documents
- Questions:
 - Do the cities understand what kind of extreme weather phenomena and impacts the city **can** face?
 - How well-prepared the cities are e.g. for a record precipitation event? Has the “extreme” event yet occurred?



Climate change and extremes

- There is no common (single) definition for a **weather or climate extreme**, but it can be defined based on different criteria:
 - The maximum/minimum value of a variable/parameter/phenomenon
 - Probability of occurrence or return period: how rarely (or often) is a certain variable value occurring?
 - Impacts: a weather event may cause even record-breaking impacts although the event is not (meteorologically) record-breaking
- All weather variables/events have their extremes
- Some extremes of variables/events cause more impacts than others
- The impact of a certain extreme event depends not only on the event itself but also where (+when) it occurs, e.g.
 - middle of forest vs. city centre
 - middle of night vs. rush hour

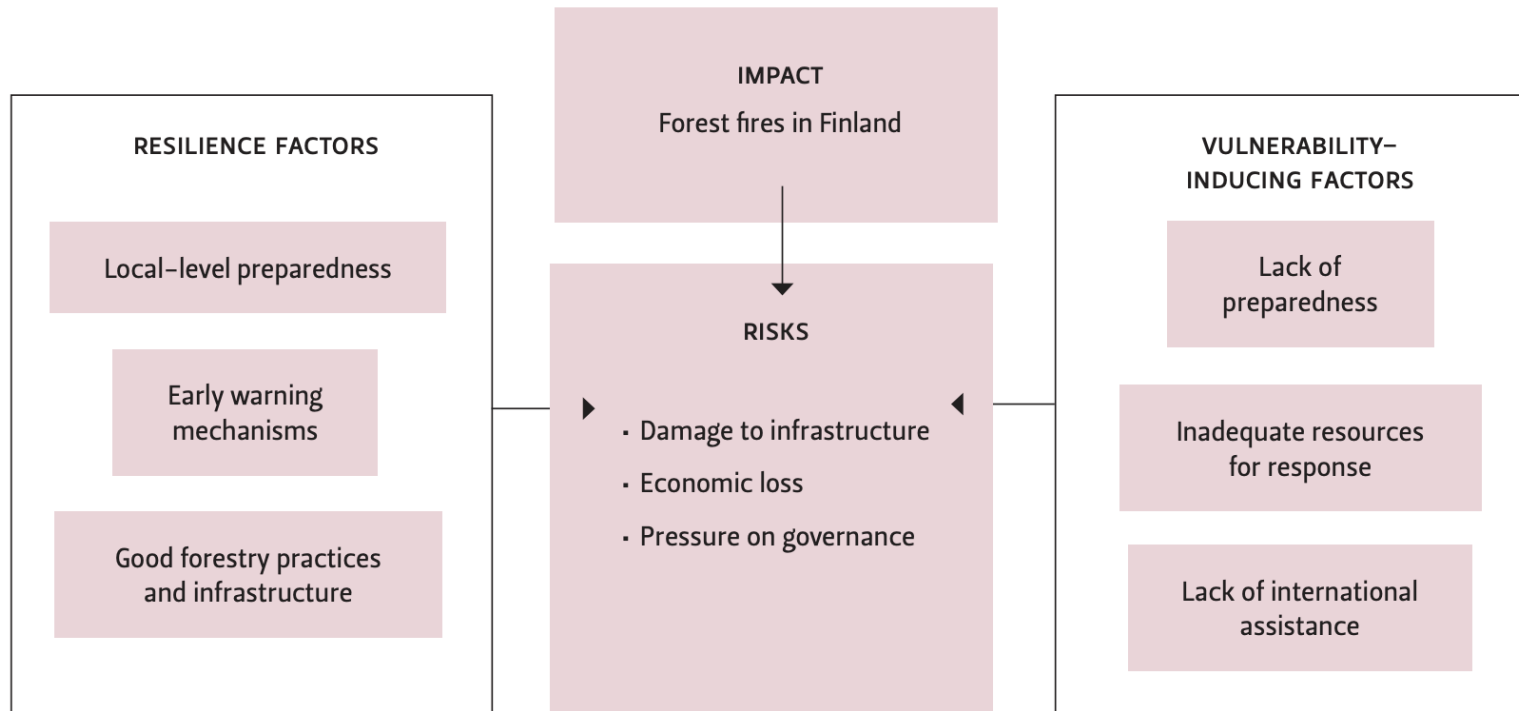


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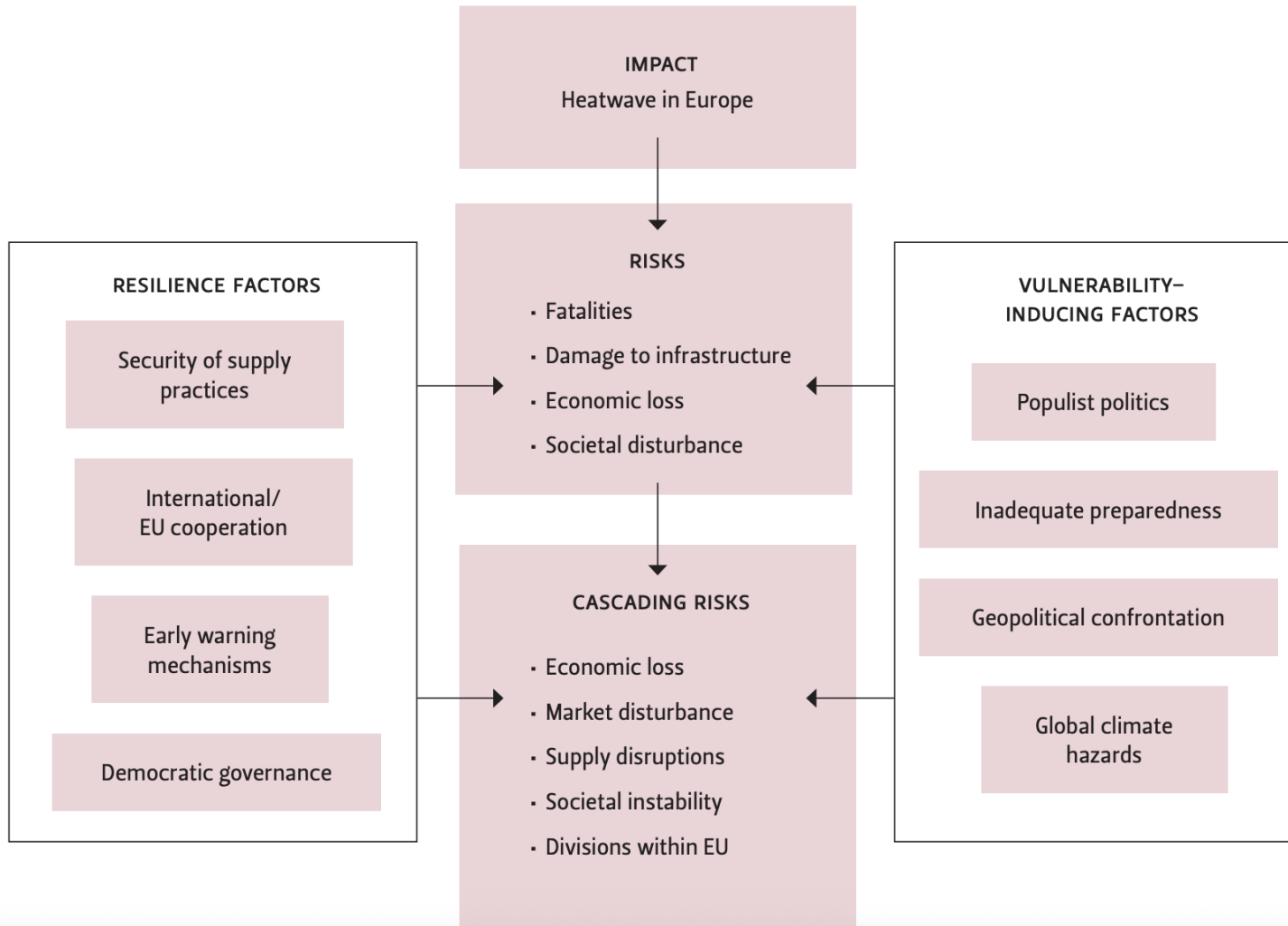
Record measured
atmos. pressure in
Finland: 1066 hPa →
so what?

Record daily precip.
in Finland: 198
mm/day → huge
impacts (but this was
in 1944)!

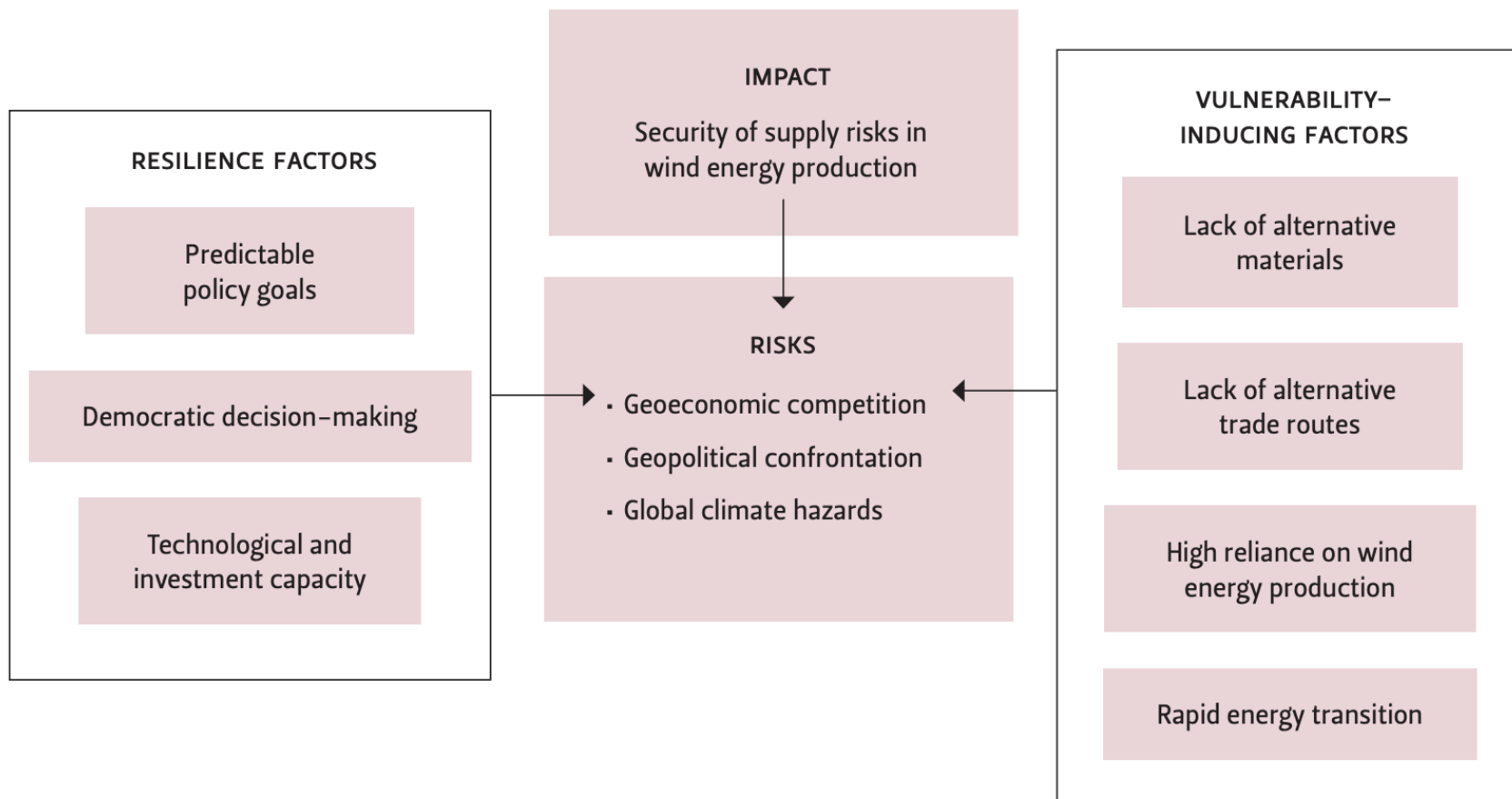
Types of impacts - Direct



Types of impacts - Cascading



Types of impacts - Transition



Sään ja ilmastonmuutoksen aiheuttamat riskit Helsingissä

ILMASTONMUUTOKSEN VAIKUTUKSET SUOMESSA METSÄNHOIDON NÄKÖKULMASTA

Ilmastonmuutoksen haitalliset vaikutukset ja toimialojen haavoittuvuus

Jaana Sorvali

SÄÄ- JA ILMASTOTIEDOT SEKÄ UUDET PALVELUT AUTTAVAT METSÄBIOTALOUSTA SOPEUTUMAAN ILMASTONMUUTOKSEEN

Ilmastonmuutos ja Suomen turvallisuus:

Uhat ja varautuminen kokonaisturvallisuuteen

Emma Hakala, Sanna Erkamo, Juha Pyykö, Oras Tynkkynen, Kati Berninger, Antti

VALTIONEUVOSTON
JA TUTKIMUSTOIMINTA

Gre..., Haanpää S, Halonen M,
Harja..., Margilevich A, Kokko A, Kollanus V,
Lanki T..., Nurmi V, Oljemark K, Parjanne A,
Peltonen-S..., Sihvola K, Punkka A-J, Raivio T, Räsänen A,
Säntti K, Tuom..., inen N, Zacheus O



Keinot edistää sää- ja ilmastoriskien hallintaa

Plenty of information to support risk management exists!

PROJECT OF FUTURE CLIMATE FOR ECUADOR, GUAY AND CHINA WITH A FOCUS ON FOREST

ARI VENÄLÄINEN
KIMMO RUOSTEEN
ILARI LEHTONEN

UVA ILMASTO
JÄRJESTELMÄN
KÄYTTÖVUOKIOTIA VARTEN

ILARI LEHTONEN
KIMMO RUOSTEENOJA
ANTTI MÄKELÄ

kutus
apitoon

Opas kuntien ilmastotyön tueksi

ILMASTONMUUTOS JA KUNNAT

VALTIONEUVOSTON
SELVITYS- JA TUTKIMUSTOIMINTA

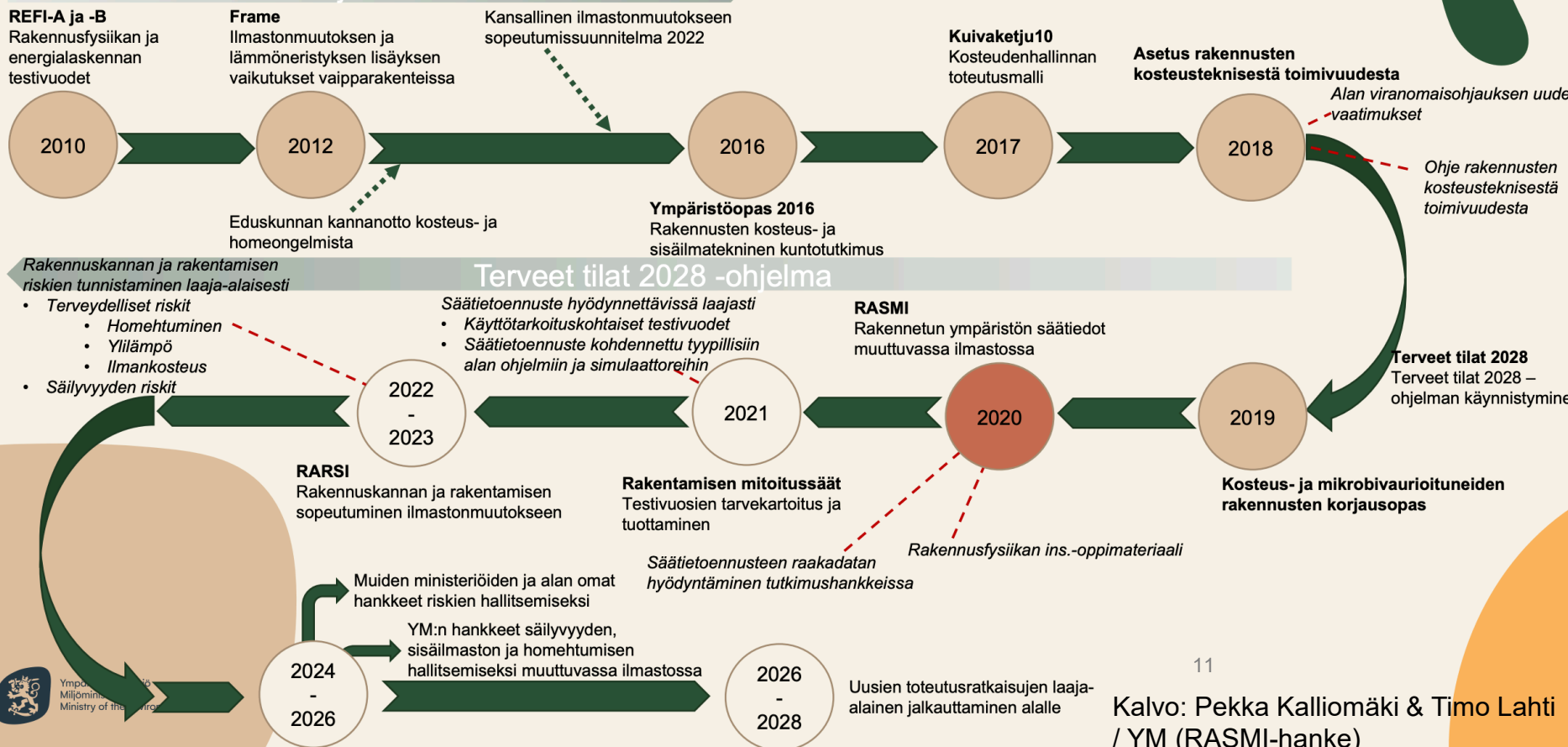
Tuomenvirta H., Haavisto R., Hildén M., Lanki T., Luhtala S., Meriläinen P., Mäkinen K., Parjanne A., Peltonen-Sainio P., Pilli-Sihvola K., Pöyry J., Sorvali J., Veijalainen N.

Sää- ja ilmastoriskit Suomessa – Kansallinen arvio

Example of strategic approach to resilience – climate-proof buildings in Finland

Rakennukset ja rakentaminen - hankeohjelma

Kosteus- ja home-talkoot



Summary

- Climate change has progressed very fast during the past decades
 - related risks have also changed
- Some risks and related impacts are not in our own hands
 - e.g. drought in Africa may impact Finland
- In order to be (or become) resilient, risk management is needed
 - If a society wants to be resilient, the resilience must propagate also to local levels
- Efficient climate resilience needs dialogue and actions in different levels within the society!





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Thank You!

Questions?

