Indigenous Vegetables and Food Security

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From Seed to Table & Beyonds# 35, 15.00-16.30 pm, 6 Sept. 2016, Kasetsart University Kampaengsaen campus

Topics:

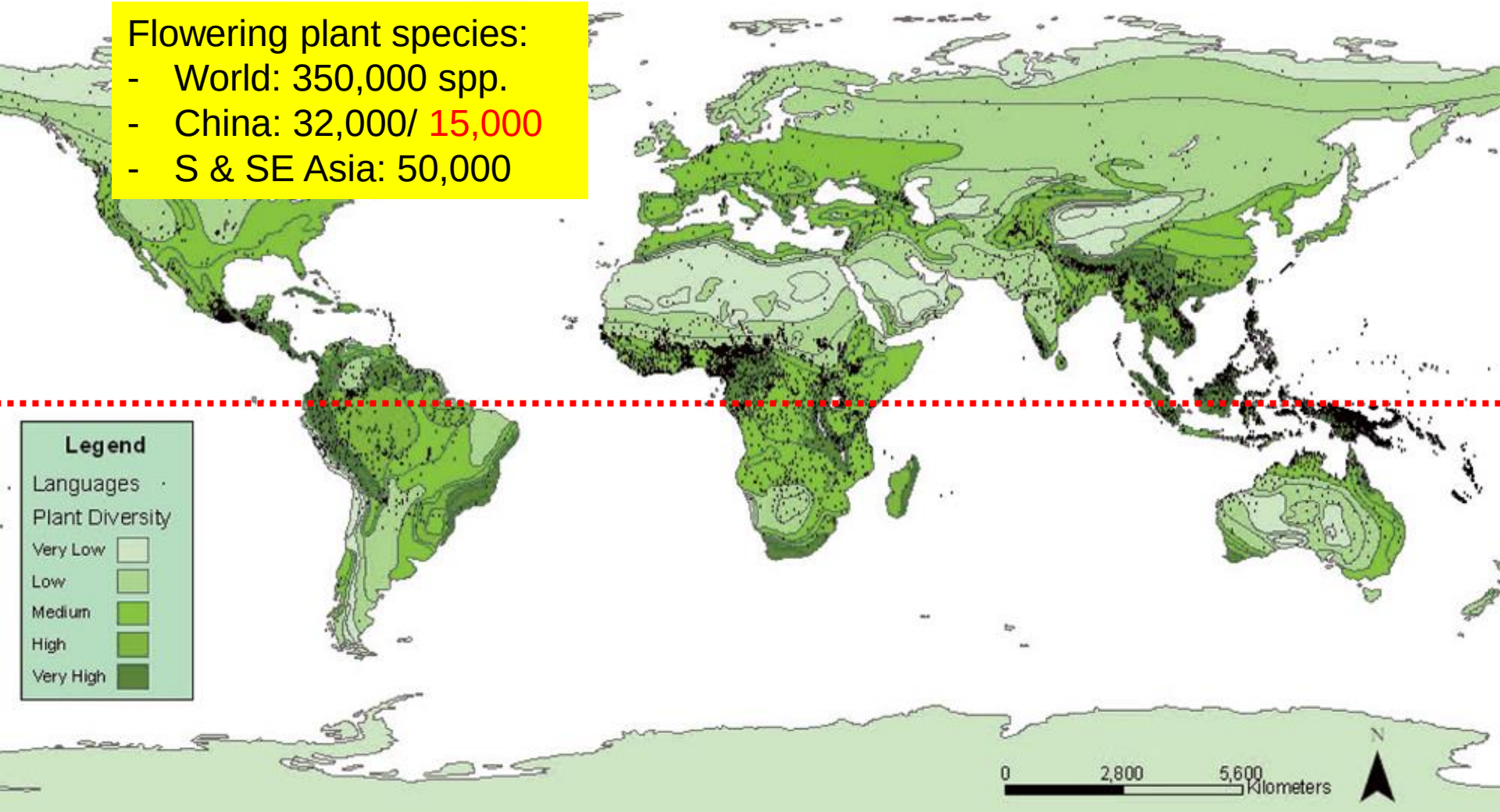
- Indigenous vegetables (IVs) ?
- Diversity: IVs species, habit, habitat, nutrition, local wisdom
- Diversity: status & problems
- IVs' socio-economic/ food security, safety & health
- Climate change & IVs
- Sustainable production with IVs' in the urban/ periurban environs: a new challenge
- Conclusion and recommendation

Indigenous Vegetables ??

- Include:
  - Native species *(wild, cultivated, weed, local landrace, obsolete cultivars)*
  - Introduced species *(naturalized, escaped, adapted)*
  - Any species or cultivars with different uses other than normal consumption
- Exclude:
  - *All modern, current breeding lines, cultivars and hybrids*
  - *Exotic and commercialized cultivars*

IVs: species diversity

Flowering plant species:
- World: 350,000 spp.
- China: 32,000/ 15,000
- S & SE Asia: 50,000



Diversity of Flowering Plant in Home Countries of Participants

country	Land area Sq. km	Flora Species no.	Species/ 100 sq.km	% of world flora
US	9,161,966	19473	0.21	5.56
Germany	384,672	2,700 ?	0.70 ?	0.77 ?
China	**9,326,410**	**32,200**	0.35	9.21
Indonesia	1,811,569	29,375	1.62	8.40
Philippines	298,170	8,930	2.99	2.55
Vietnam	310,070	10,500	3.39	3.00
Thailand	510,890	11,620	2.27	3.32
World	**148,940,000**	**350,000**	**0.0023**	**100**

Source: World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC), 2004. Species Data (unpublished, September 2004).

Vegetable diversity

- **Plant uses(global):** c. 5,000 species
- **Vegetables**:
  - SE Asia: 1,000 spp./ 50 economic species
- **PROSEA 8**(1993):
  - Major veg.: 63 genera, > 80 species
  - Minor veg.: > 110 species
  - Other primary uses: >800 species
- **AVRDC**-RETA5839
  - More than 4,000 accessions of IVs collected

IVs: habit diversity

- Plant forms:
  - Above ground: *Herb, Shrub, Tree, Climber*
  - Underground part: *storage root, bulb, rhizome, tuber*
- Plant life cycle:
  - Annual
  - Biennial
  - Perennial (most tropical vegetables)

aquatic vegetables

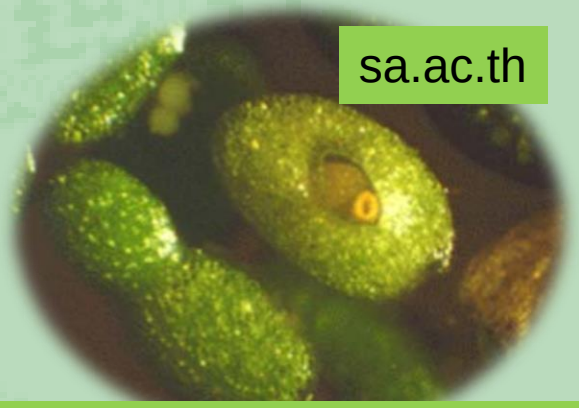
IVs' habit/habitat

freechilchil.com

thaigoodview.com

wongnai.com

Neptunia oleracea: water mimosa ผักกะเฉด



sa.ac.th

http://nanasarakaset.blogspot.com/2012/03/blog-post_06.html

Wolffia globosa ผำ ไข่น้ำ

IVs' habit/habitat

Oroxylum indicum เพกา

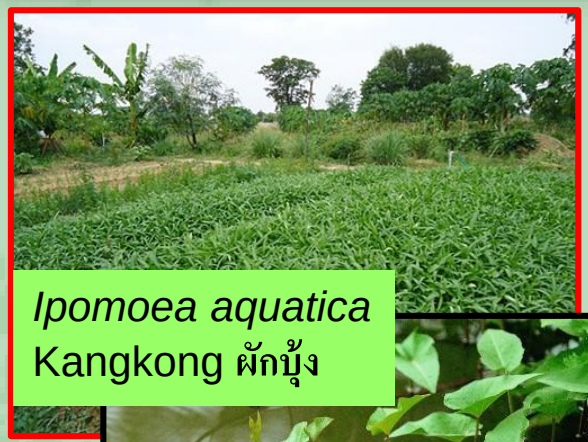
Parkia speciosa
Patai สะตอ

Coccinia grandis /
wild cucumber ตำลึง

Acacia pennata ชะอม

Curcuma longa
Turmeric ขมิ้นชัน

Piper nigrum/pepper/พริกไทย



Ipomoea aquatica
Kangkong ผักบุ้ง

Solanum melongena /
Eggplant มะเขือ

IVs: habitat diversity

- Aquatics:
  - Free floating, submerge, emerge
  - Floating with stem growth underwater
  - Marshy area, seasonal flooding
- Terrestrials:
  - Beach, coastal sand dune, mangrove
  - Arable, marginal, wild habitat
  - Arid/ semi-arid/ humid
  - Lowland/ highland
  - Soil salinity, acidity

บอนจีน ตาละปัดฤาษี
Pak- Bon- Jeen

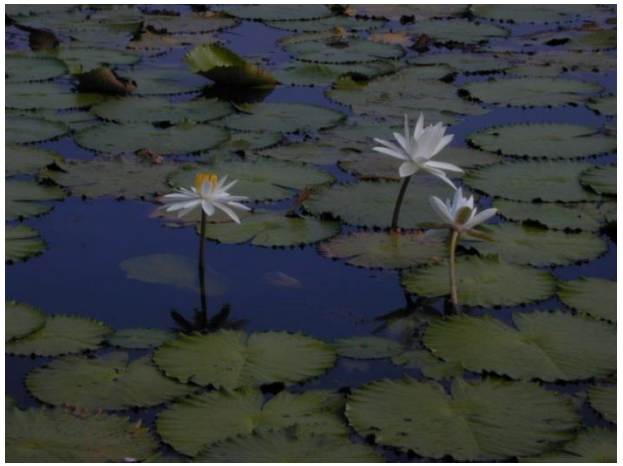
Limnocharis flava (L.) Buchenau

สายบัว ไหลบัว

Water Lily –rhizome(1) flowering stalk(3)

Nymphaea lotus Linn.

(1)



(2)

(3)

(4)

ผักคราด
Para Cress, Toothache Plant

Spilanthes acmella Murr.

ผักบุ้ง

Ipomoea aquatica, kangkong, morning glory

ผักบุ้งจีน chinese morning glory
terrestrial type

ผักบุ้งไทย Thai morning glory
aquatic type

ผักปลัง Ceylon spinach/ *Basella alba* L.

ผักชี – Phak-chee

ผักชี coriander
Corindrum sativum

ผักชีฝรั่ง eryngo
Eryngium foetidum

ผักชีล้อม Java water dropwort
Oenanthe javanica

ผักลาว dill
Anethum graveolens

ชะอม

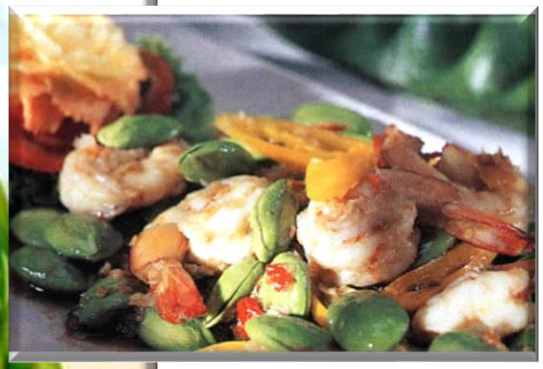
Acacia pennata Willd.

กะถิน - Lead tree

Leucaena glauca Linn.

Parkia speciosa

สะตอ, “Patai or stink bean”



Gnetum gnemon

ผักเหลียง phak miang, gnetum

ผักหวาน
sweet vegetable

Sauropus androgynous
ผักหวานบ้าน

Melientha suavis
ผักหวานป่า

Spices

Zingiber officinale
Ginger ขิง

Alpinia galanga
galangal, ข่า

Citrus hystrix
Leech Lime, มะกรูด

Cymbopogon citratus
Lemon grass, ตะไคร้

Capsicum spp.
Chili พริกต่าง ๆ

Citrus aurantifolium
Lime, มะนาว

Spices

Ocimum tenuiflorum
Holy basil กะเพรา

Ocimum americanum
Hairy basil แมงลัก

Ocimum basilicum
sweet basil โหระพา

Ocimum gratissimum
Himalayan basil กะเพราช้าง ยี่หร่า

Mentha arvensis
Garden mint สะระแหน่

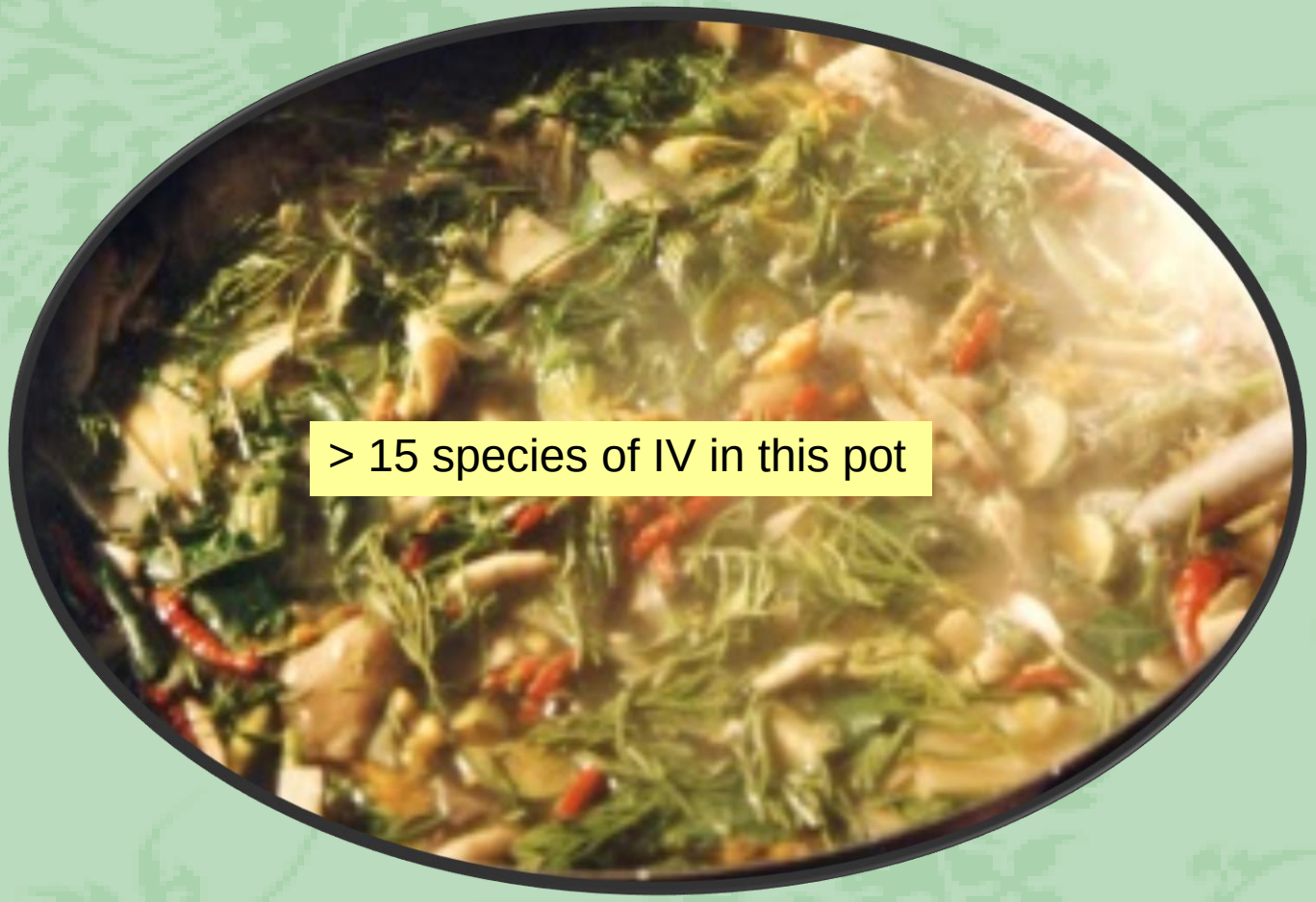
Centella asiatica
Asiatic pennywort บัวบก

IVs: socio-economic/ food security & safety

- IVs for self consumption
- IVs for local market
- IVs for world market
- IVs provide more labor/ more job for IVs farming

IVs in local market: provide more job and food security

IVs: source of micronutrients



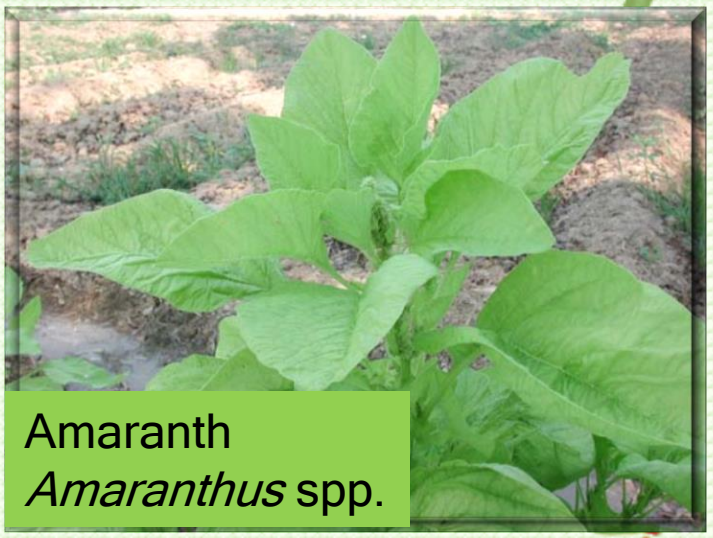
Nutrient sources

- Leafy IV; Amaranth

  high Fe and Ca

  - Essential for growth and development of bones and teeth
  - Prevent Fe deficiency (anemia)
- Dark, green leafy vegetables; sweet basil

  high Provitamin A (Beta-carotene)



Amaranth
Amaranthus spp.

Sweet basil
Ocimum basilicum L.

- **High vitamin A (> 7600 IU)**
  - Hoary basil, Sweet basil, Sesban tree, Amaranth, Rosella, Acacia shoot

Hoary basil : *Ocimum americanum* Linn.

Sesban tree : *Sesbania grandiflora* Pers.

- **High Niacin (B-complex) (> 1.9 mg)**
  - Pepper, Acacia shoot

Pepper: *Piper nigrum* Linn.

Acacia pennata Willd.

- **High Vitamin C (>100 mg)**
  - Horse-radish tree, Coriander (*Coriandrum sativum*), Hot pepper/ chili

Horse-radish tree
(*Moringa oleifera* Lamk.)

Hot pepper
(*Capsicum frutescens*)

- High Calcium (> 200 mg)
  - Pepper, Amaranth, Water mimosa, Sweet basil

Pepper leaves
Piper retrofractum Linn.

Water mimosa
Neptunia oleracea Loureiro

- **High Iron (> 150 mg)**
  - Sweet basil, Amaranth, Mint

Amaranthus sp.

Kitchen mint
Mentha cordifolia Opiz.


Problems !!
• Rapid loss of local wisdom
• Rapid loss of biodiversity

Rapid Loss of Local Wisdom

- Change of family structure from extended family with several generations stay together to nuclear family with only two generations, 2 parents and children
- More development toward industrialization
- Change of market structure from local market to hyper- or supermarket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7840

Loss of Biodiversity

- Deforestation
- Desertification
- Environmental destruction
- Global warming

Human activities

Biological extinction

Loss of Biodiversity

Global Warming Effects and Causes: A Top 10 List

Sources: http://planetsave.com/author/naturalpapa/
Planetsave (http://s.tt/12tkS)

1. **Global Warming Cause**: *Carbon dioxide emissions from fossil fuel burning power plants*
2. **Global Warming Cause**: *Carbon dioxide emissions from burning gasoline for transportation*
3. **Global Warming Cause**: *Methane emissions from animals, agriculture such as rice paddies, and from Arctic seabeds*
4. **Global Warming Cause**: *Deforestation, especially tropical forests for wood, pulp, and farmland*
5. **Global Warming Cause**: *Increase in usage of chemical fertilizers on crop lands*

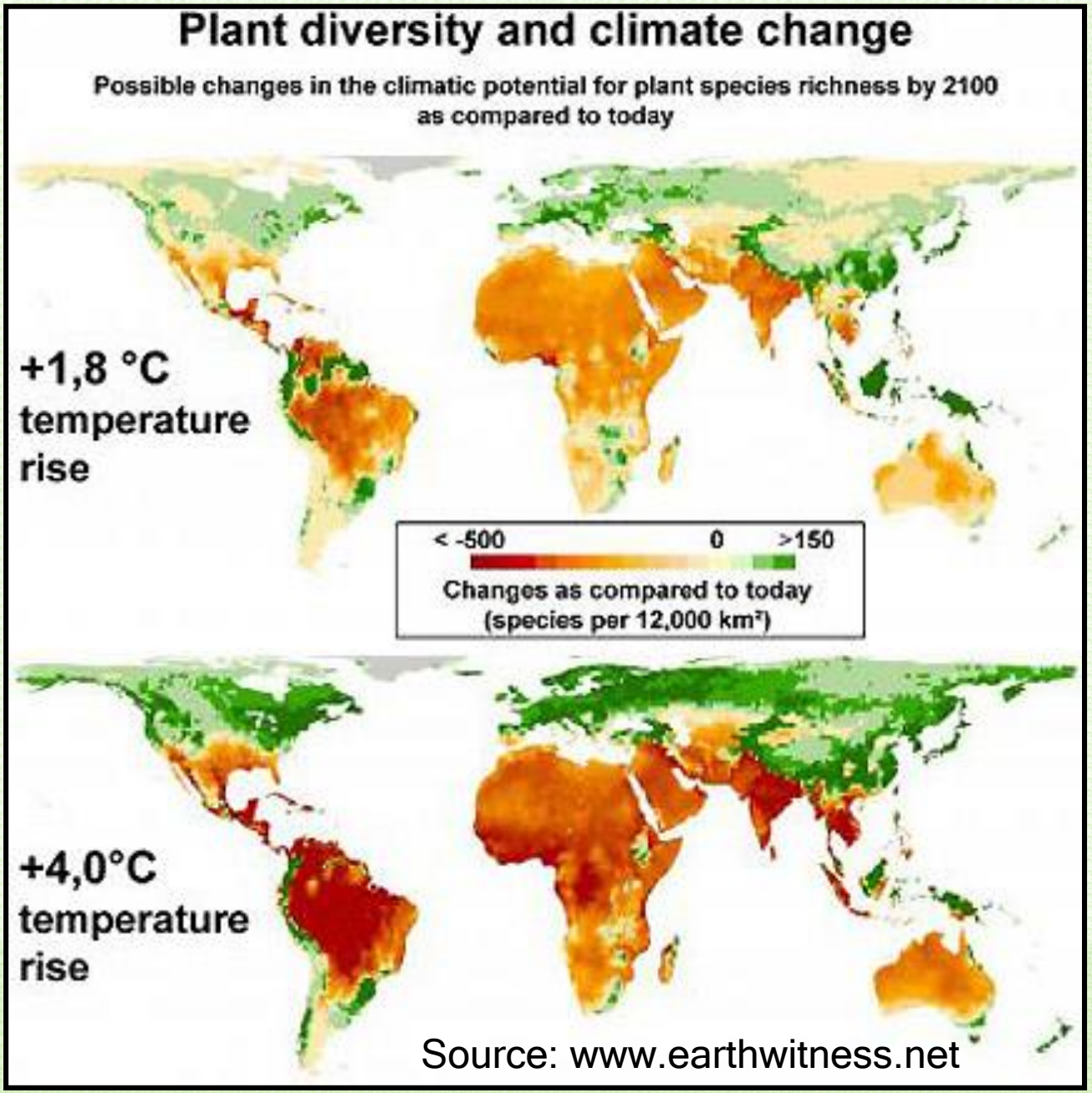
6. **Global Warming Effect:** ***Rise in sea levels worldwide***

7. **Global Warming Effect:** ***More killer storms***

8. **Global Warming Effect:** ***Massive crop failures***

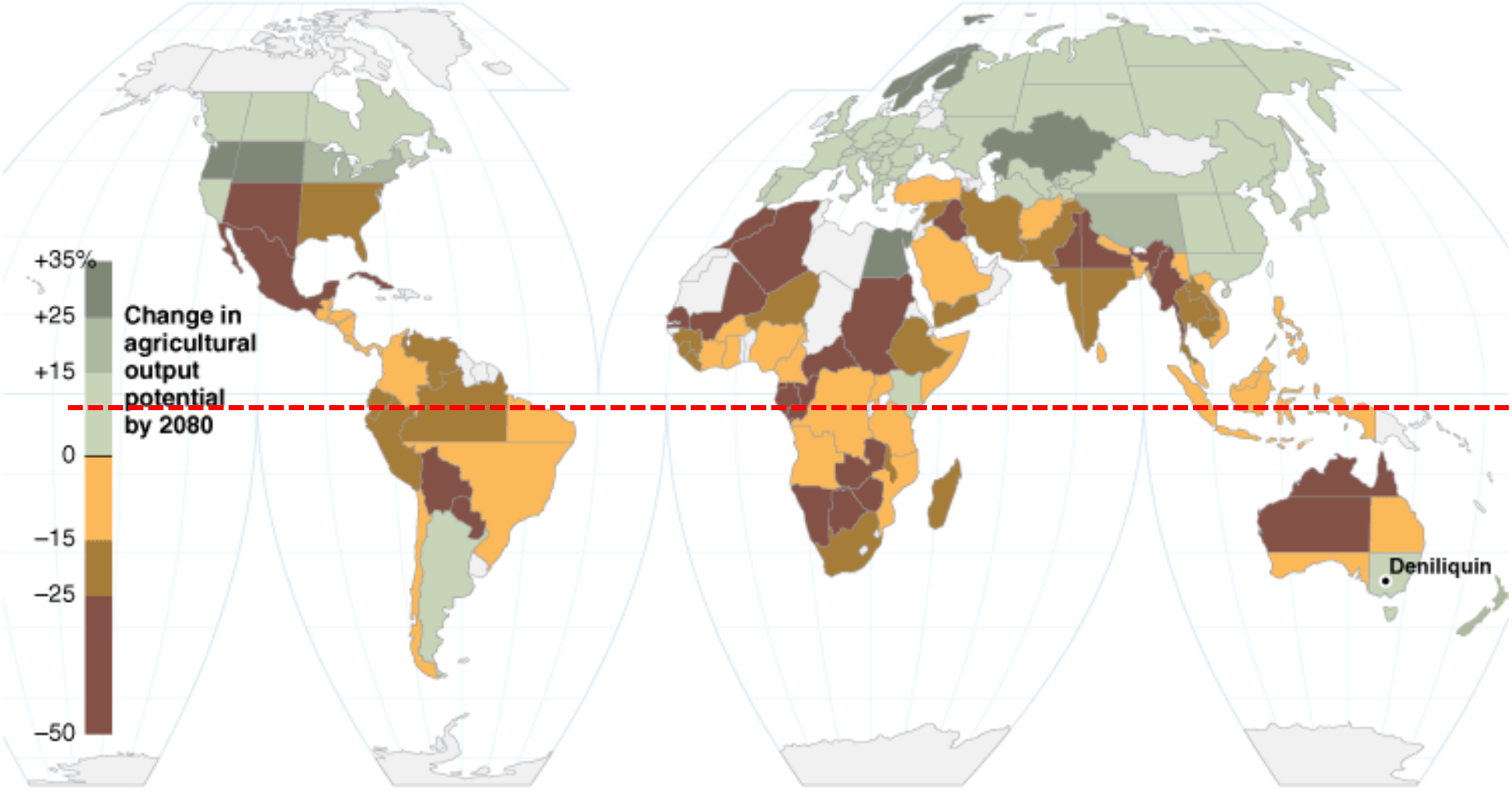
9. **Global Warming Effect:** ***Widespread extinction of species***

10. **Global Warming Effect:** ***Disappearance of coral reefs***


Plant diversity and climate change
Possible changes in the climatic potential for plant species richness by 2100 as compared to today
+1,8 °C temperature rise
< -500
0
>150
Changes as compared to today (species per 12,000 km²)
+4,0°C temperature rise
Source: www.earthwitness.net

Farming in a Warmer World

Crop forecasts show that some countries farther from the Equator could benefit from a warmer world, but others would be worse off by 2080 if global warming were to proceed unchecked. Long-range forecasts vary widely; the following is a synthesis of available forecasts by country or region.



Note: These figures assume that crops grow faster because of higher levels of carbon dioxide in the air. But some scientists say that the actual effects of global warming could be worse than shown here, because the benefits of extra carbon dioxide may not appear if crops lack proper rainfall, proper soil and clean air.

Source: "Global Warming and Agriculture: Impact Estimates by Country," by William R. Cline, Peterson Institute, 2007.

Fighting Climate Change with IVs Diversity

IVs: climate change

- Change attitude: *diversify food vegetables*
- Grow your own vegetables from wide choice of IVs
- Integrated crops/ avoid mono-cropping
- Practice:
  - Crop rotation
  - Multiple cropping
  - Multi-layered cropping

Conclusion and Recommendation

- Conclusion:
  - High diversity exists in IVs
  - IVs is major source of micronutrient
  - IVs loss their popularity, genetic resource and local wisdom
- Recommendations:
  - Make full use of IVs' diversity in crop integration
  - Support more research on IVs' bio-function and nutrition
  - Public education to promote and increase IVs' consumption


Question ?