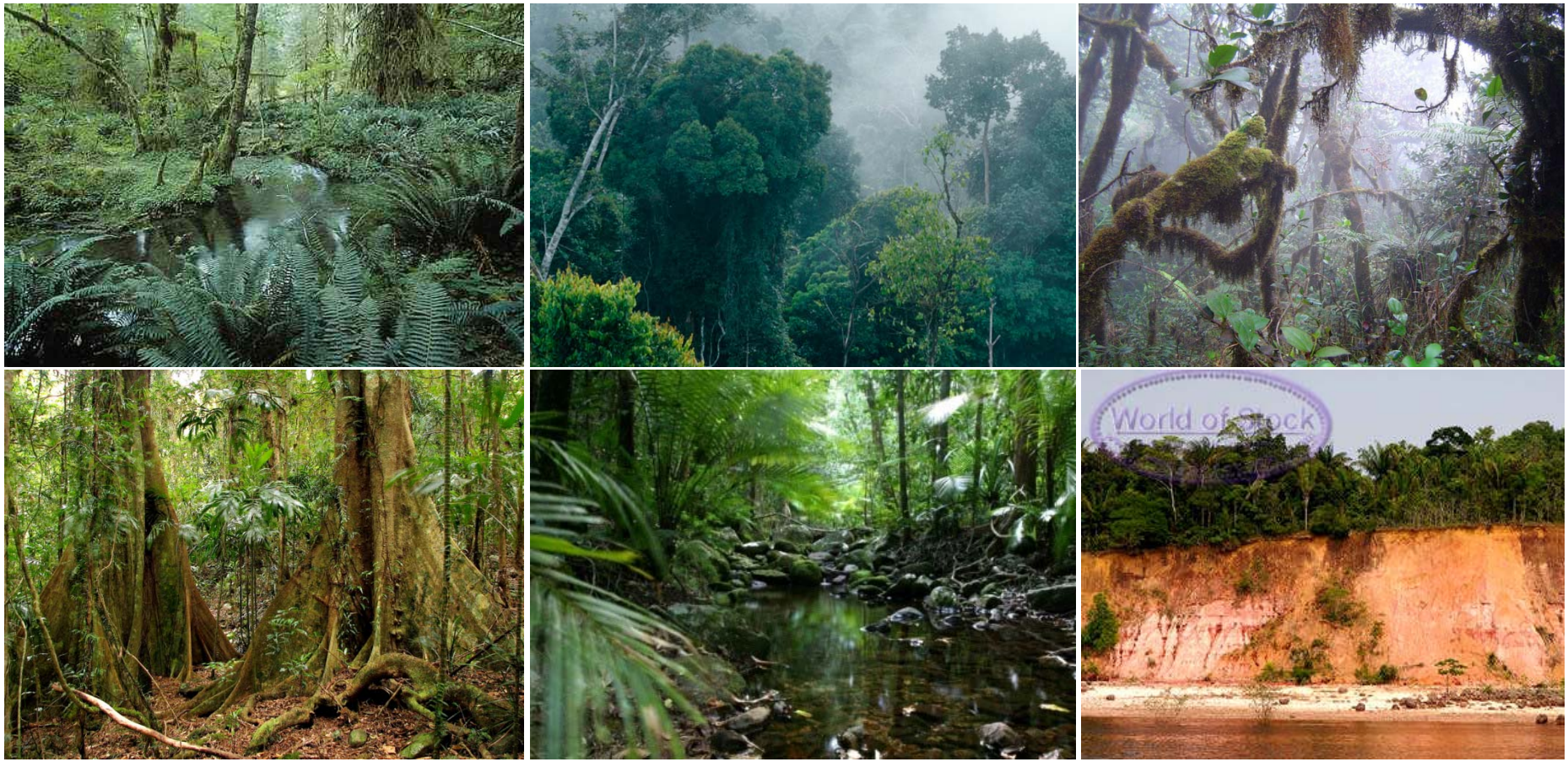
I. Rainforests and the tropical climate zone

What characterizes tropical climate and growth conditions?



I. Rainforests and the tropical climate zone

What characterizes tropical climate and growth conditions?

- warm; modest fluctuations between day and night
- high humidity and much rain, during most/all parts of the year (annual precipitation ~ 260 cm. (100 in.) in wet rain forests (but can go even higher)
- modest seasonality
- little to no variation in day length throughout the year
- water is generally abundant, in fact sometimes there is way too much
- sun light is reasonably abundant in higher strata but not near ground level
- tropical soil is poor in nutrients

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II. Deserts and the arid climate zone

What characterizes desert climate and growth conditions?

II. Deserts and the arid climate zone

What characterizes desert climate and growth conditions?

- substantial daily temperature fluctuations, cold (but not freezing) to very hot
- extremely dry most of the year, low humidity, (annual precipitation: 0.25 cm (0.1 in) in Sahara; 7-30cm (3-12 in) in Sonoran desert).
- if rain than concentrated during brief parts of the year, then pronounced seasonality with a brief rainy season and a long dry season
- as a consequence sun light is over-abundant but water is (extremely) rare
- even in “rainy” deserts, rainy seasons may skip a year or 2 or 3...

III. Temperate climate zone

What characterizes temperate climate and growth conditions?

III. Temperate climate zone

What characterizes temperate climate?

- significant *daily* temperature fluctuations
- substantial *seasonal* temperature fluctuations depending on region, e.g. 24C/43F for Great Basin region, 7C/12F for Mediterranean, 31C/56F for deciduous forests
- water availability fluctuates during the year but good at least during part of it
- annual precipitation <10 cm (4 in) in the driest regions to 50 cm (20 in) in the moister steppes and the mediterranean to 81 cm (32 in) in deciduous forests.
- but overall: winter = cold and dry season
- soil quality is poor to extremely good

I. List of plant adaptations to tropical climates

- large dark-green leaves (= lots of chlorophyll) to absorb sun light, especially in understory with lots of shade
- leaf arrangement maximizes light capture
- slick waxy cuticle to allow rain to run off
- shallow roots (no need to go deep for nitrogen or water) and buttress or stilt roots (to help with stability)
- epiphytic life style (orchids, bromeliads, ferns, cacti etc) allows to be near sun light; soil not that great anyway, aerial roots instead
- many climbing plants (lianas, strangler figs, rattan, etc)
- continuous growth (no year-rings in trees); trees can reach enormous hights
- .....

II. List of plant adaptations to desert climates

- **Sun avoidance and tolerance;** small leaves or no leaves at all to minimize water loss
- photosynthesis instead often in trunk
- leaves frequently modied to spines which aid in defense but also can reflect excess light
- “accordion trunk” to reduce sun exposure
- special CO_2 capture mechanism (C4/CAM) to minimize water loss while absorbing CO_2
- highly reflective cuticle to reflect excess light
- dense hair to generate isolating boundary layer
- extremely seasonal growth and reproduction
- long lived, must be able to skip years if seasons don’t allow
- **succulence;** storing of water in specialized tissues (fleshy leaves, trunks, underground etc)
- also extensive and deep root system

III. List of plant adaptations to temperate climates

- annual life cycle
- deciduousness when perennial
- if not deciduous then leafs are needles protected by thick cuticle to survive winter
- thick bark to protect against cold winters