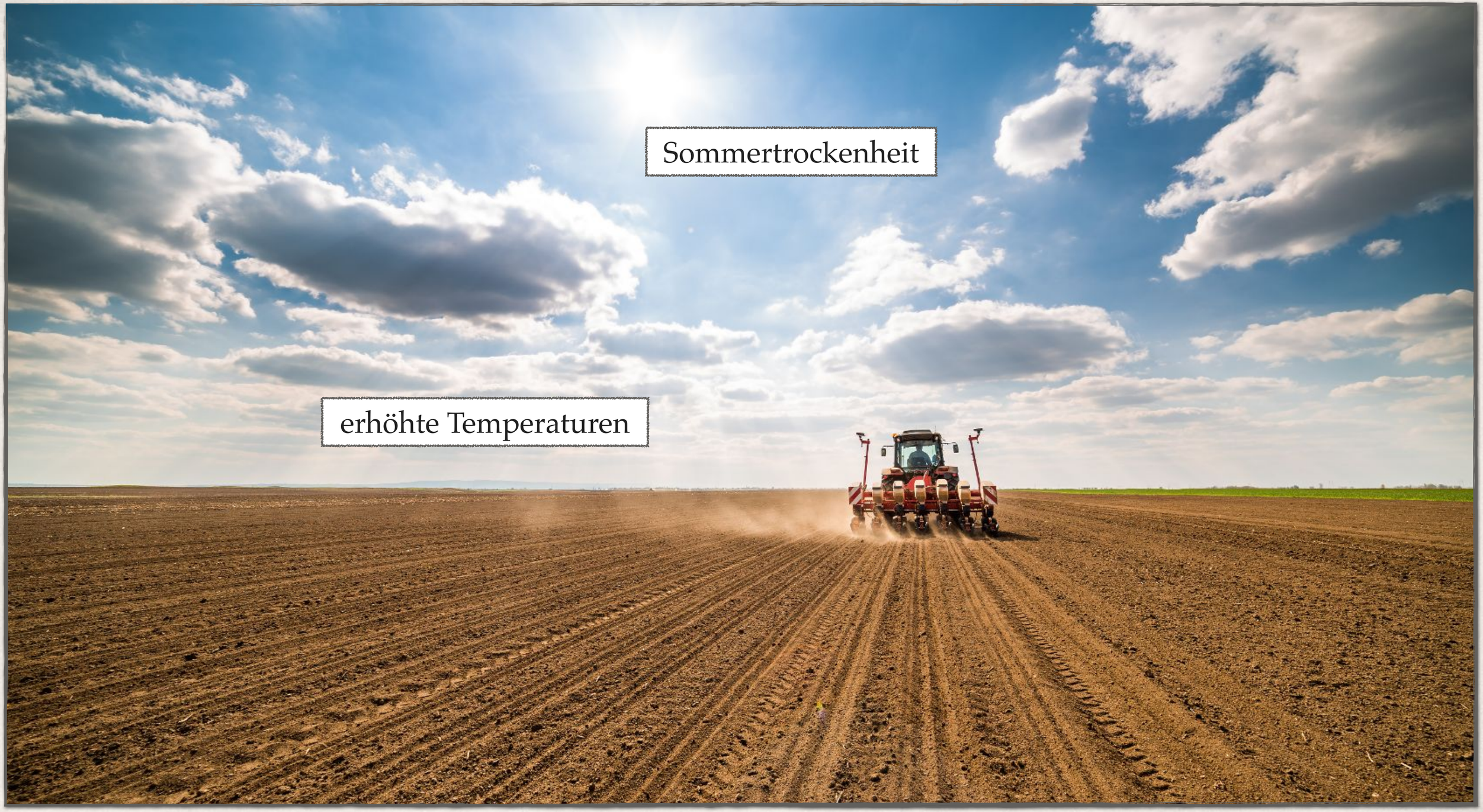
Klimalandschaften

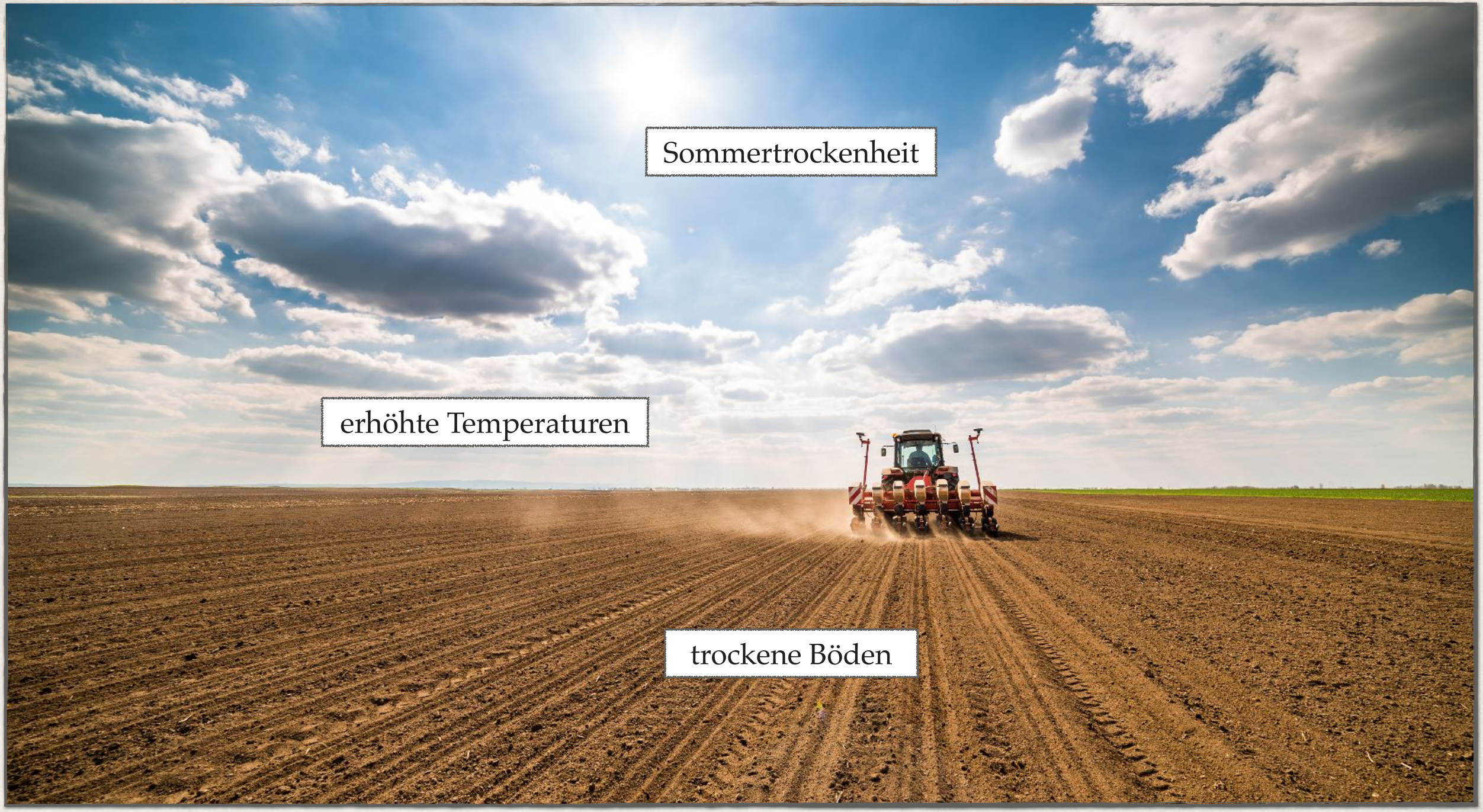
Wie die Gestaltung unserer Landschaft Einfluss auf das lokale und regionale Klima hat

Stefan Schwarzer • Aufbauende Landwirtschaft e.V. • www.aufbauende-landwirtschaft.de

Foto: Philip Gerhardt, www.baumfeldwirtschaft.de


Sommertrockenheit


Sommertrockenheit
erhöhte Temperaturen


Sommertrockenheit
erhöhte Temperaturen
trockene Böden

Ellison, D., Wang-Erlandsson, L., van der Ent, R. & van Noordwijk, M. Upwind forests: managing moisture recycling for for nature-based resilience

Schlesinger, W. H. & Jasechko, S. Transpiration in the global water cycle.

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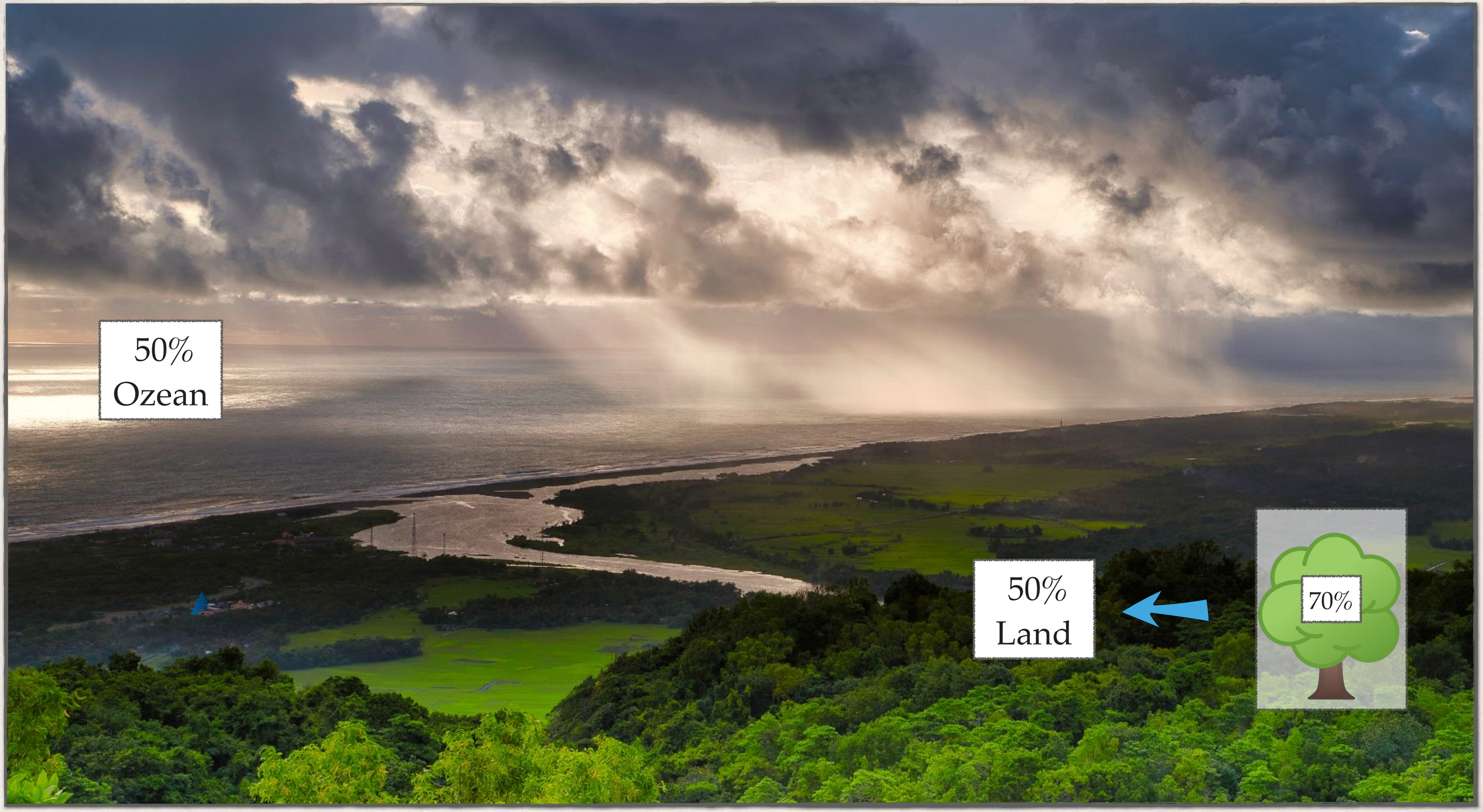

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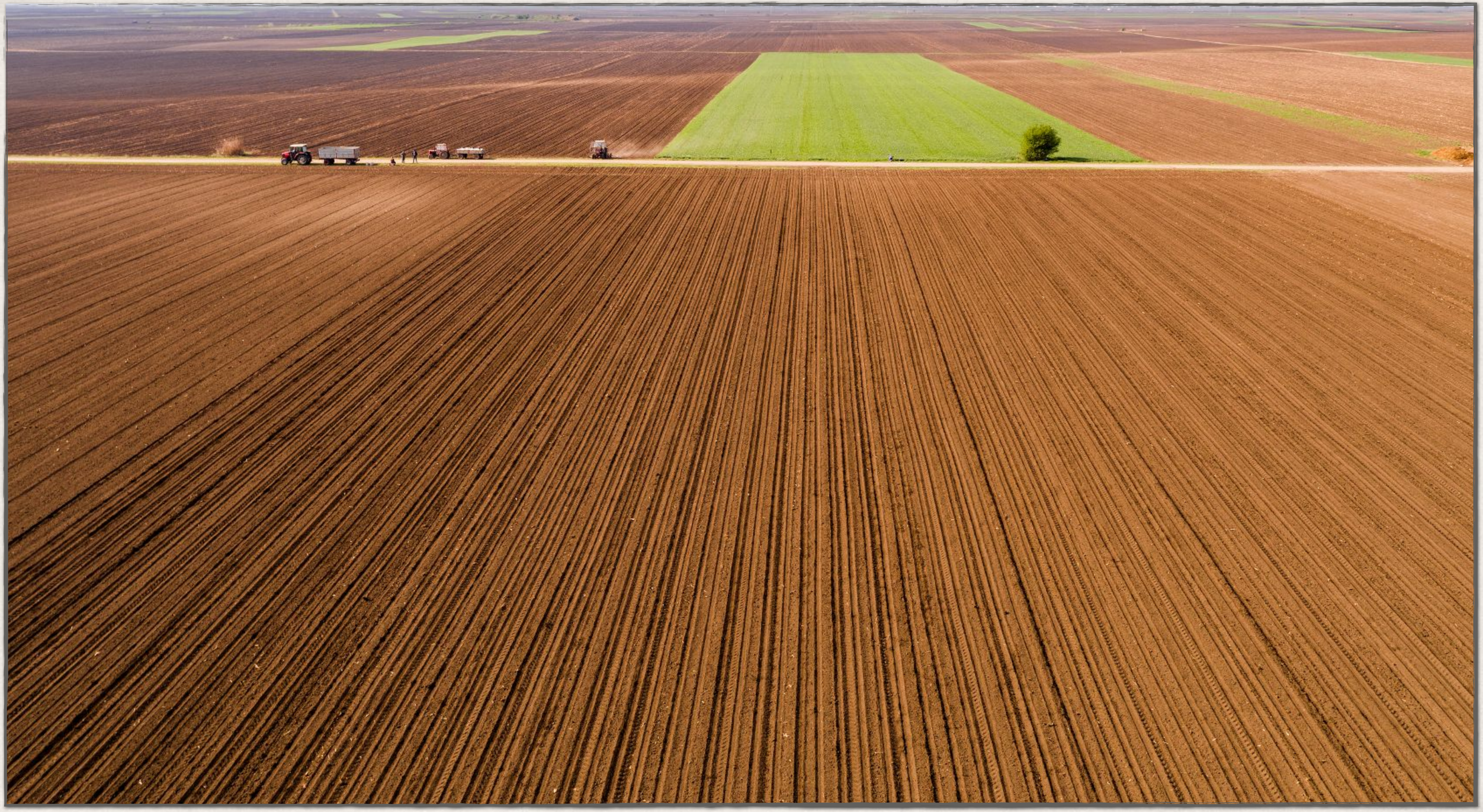
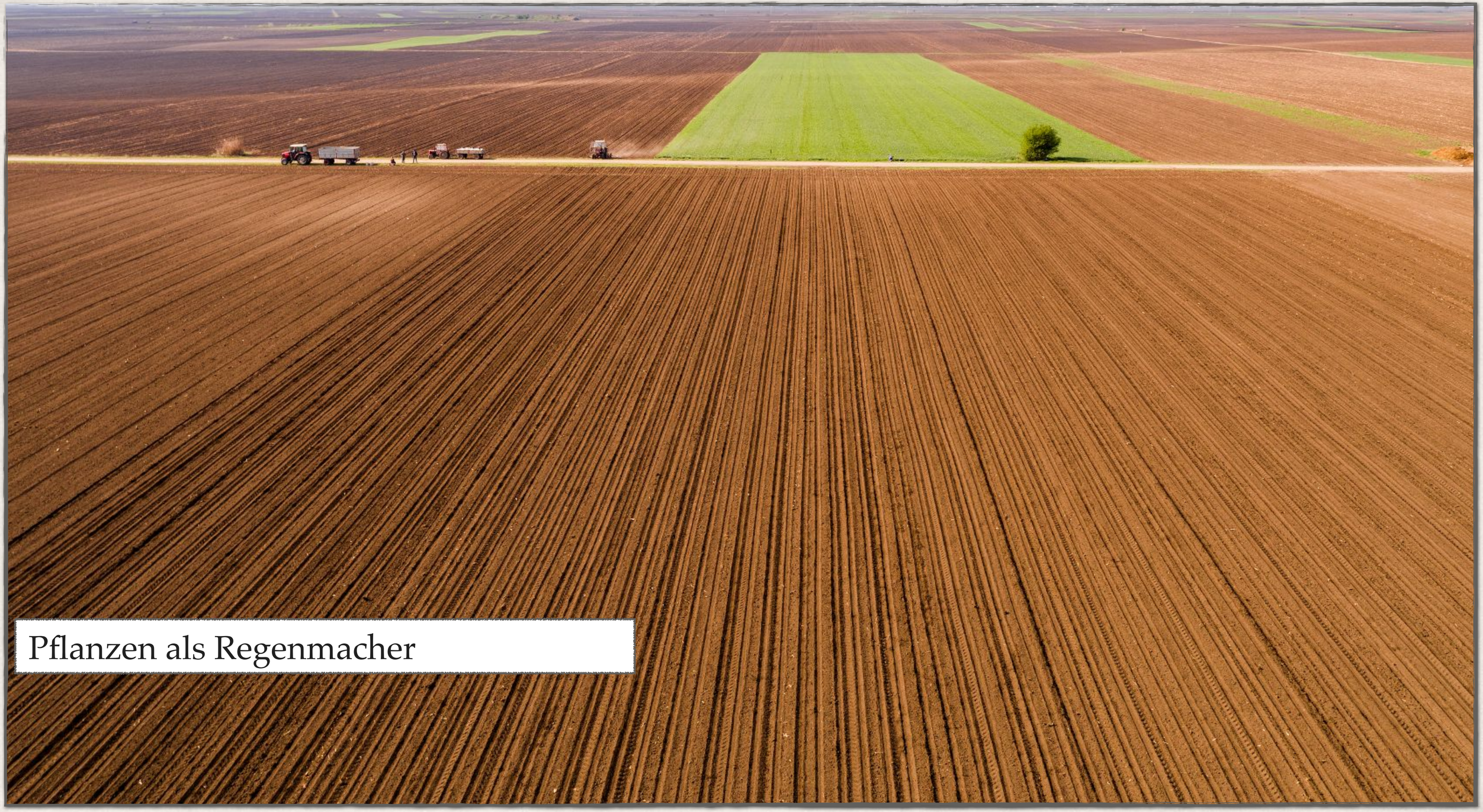




Pflanzen als Regenmacher

Pflanzen als Regenmacher

Pflanzen zur Klimakühlung

Pflanzen als Regenmacher

Pflanzen zur Klimakühlung

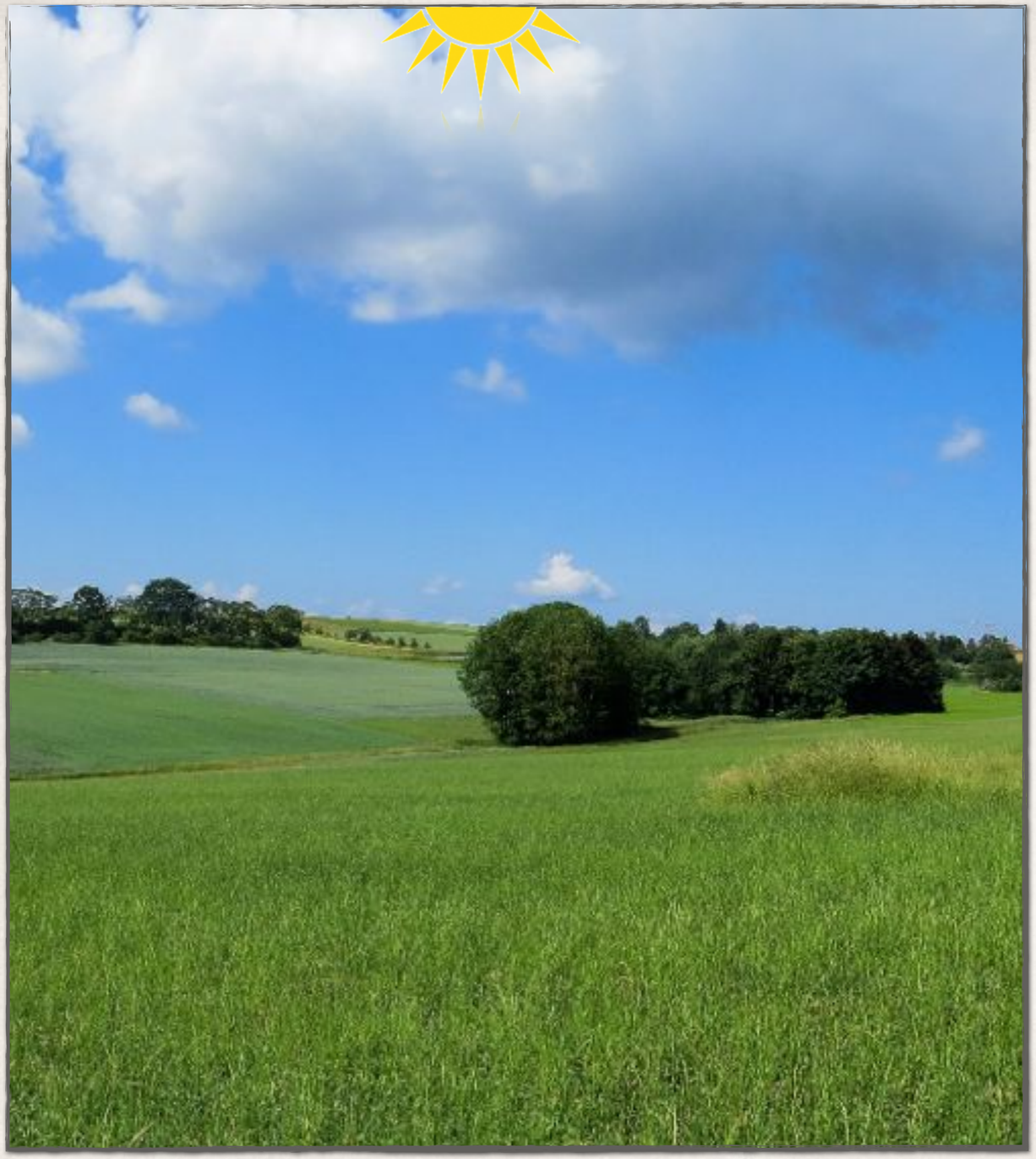
Wasserrückhalt in der Land(wirt)schaft

Pokorny, J., 2019. Evapotranspiration, in: Encyclopedia of Ecology. Elsevier, pp. 292–303

400 Liter Wasser / Tag

10 Klimaanlagen

Pokorny, J., 2019. Evapotranspiration, in: Encyclopedia of Ecology. Elsevier, pp. 292–303



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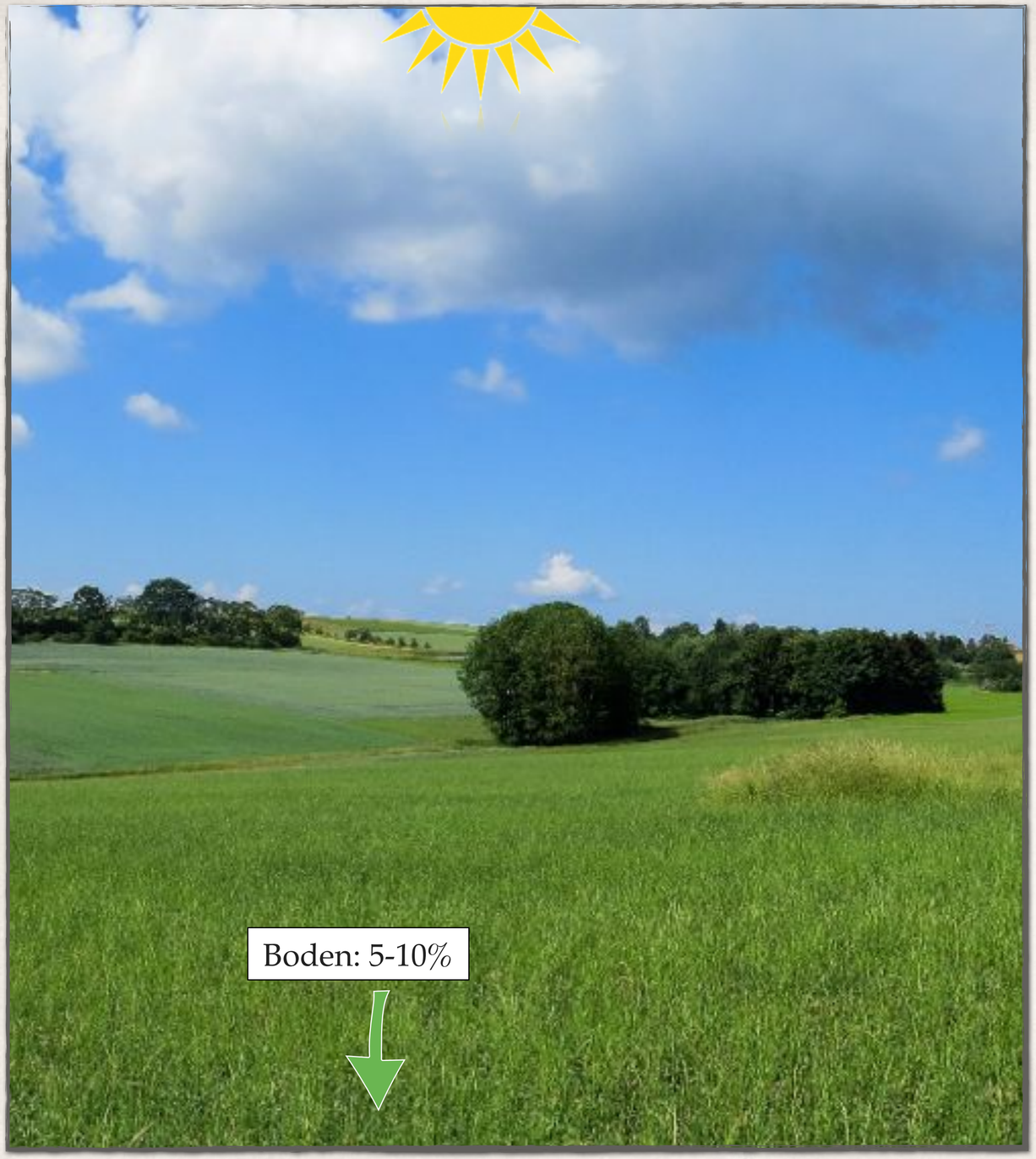

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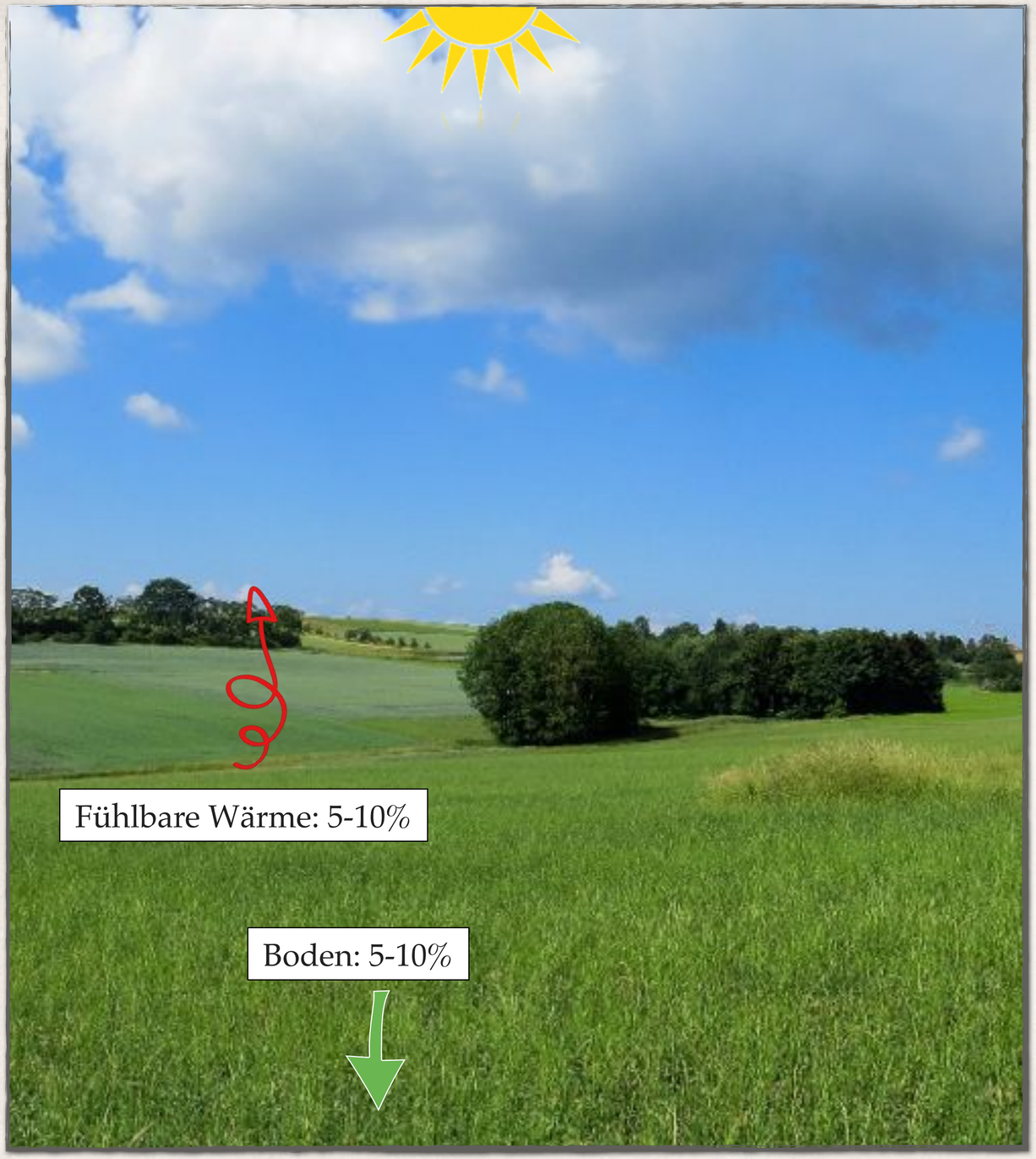

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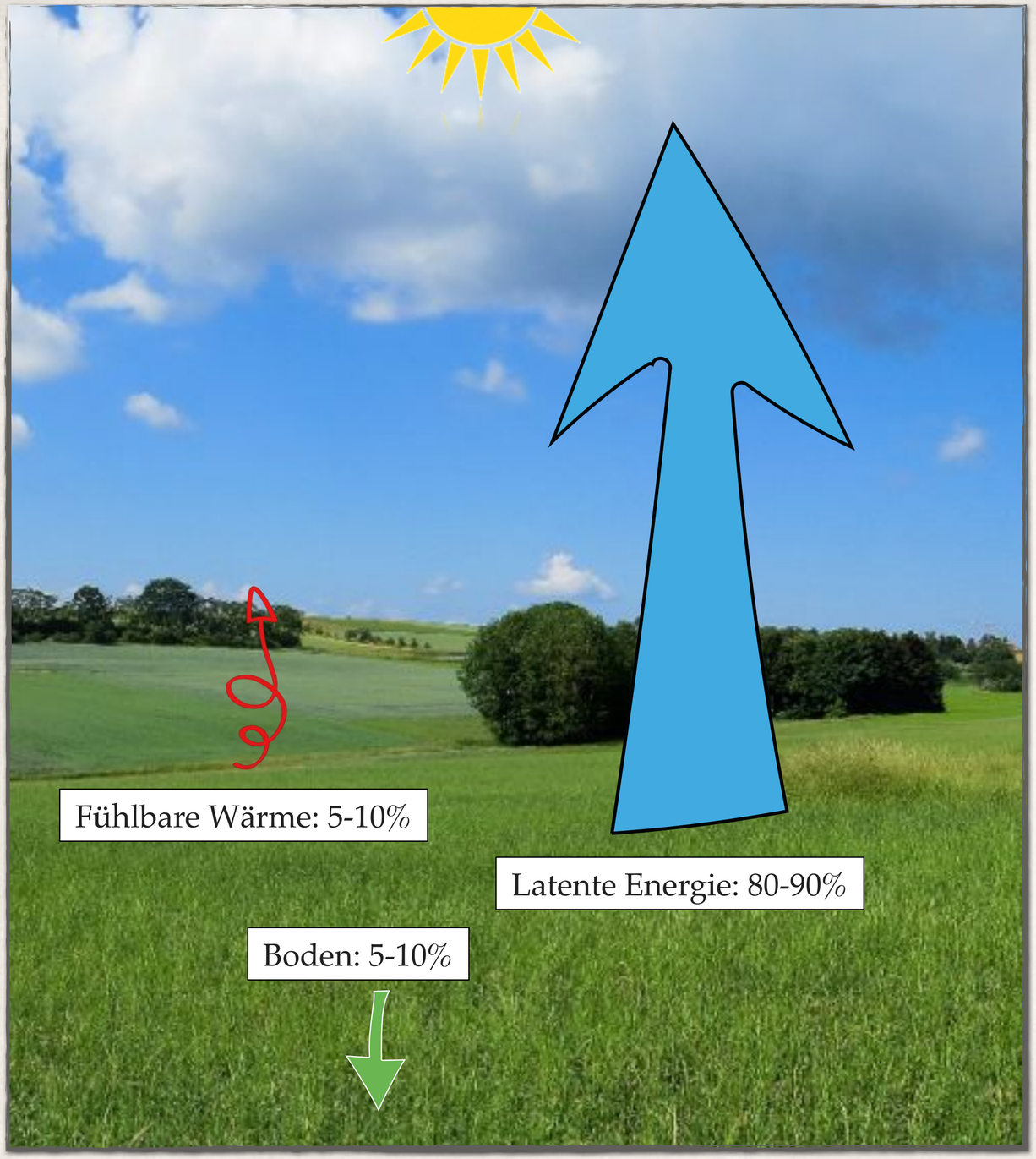

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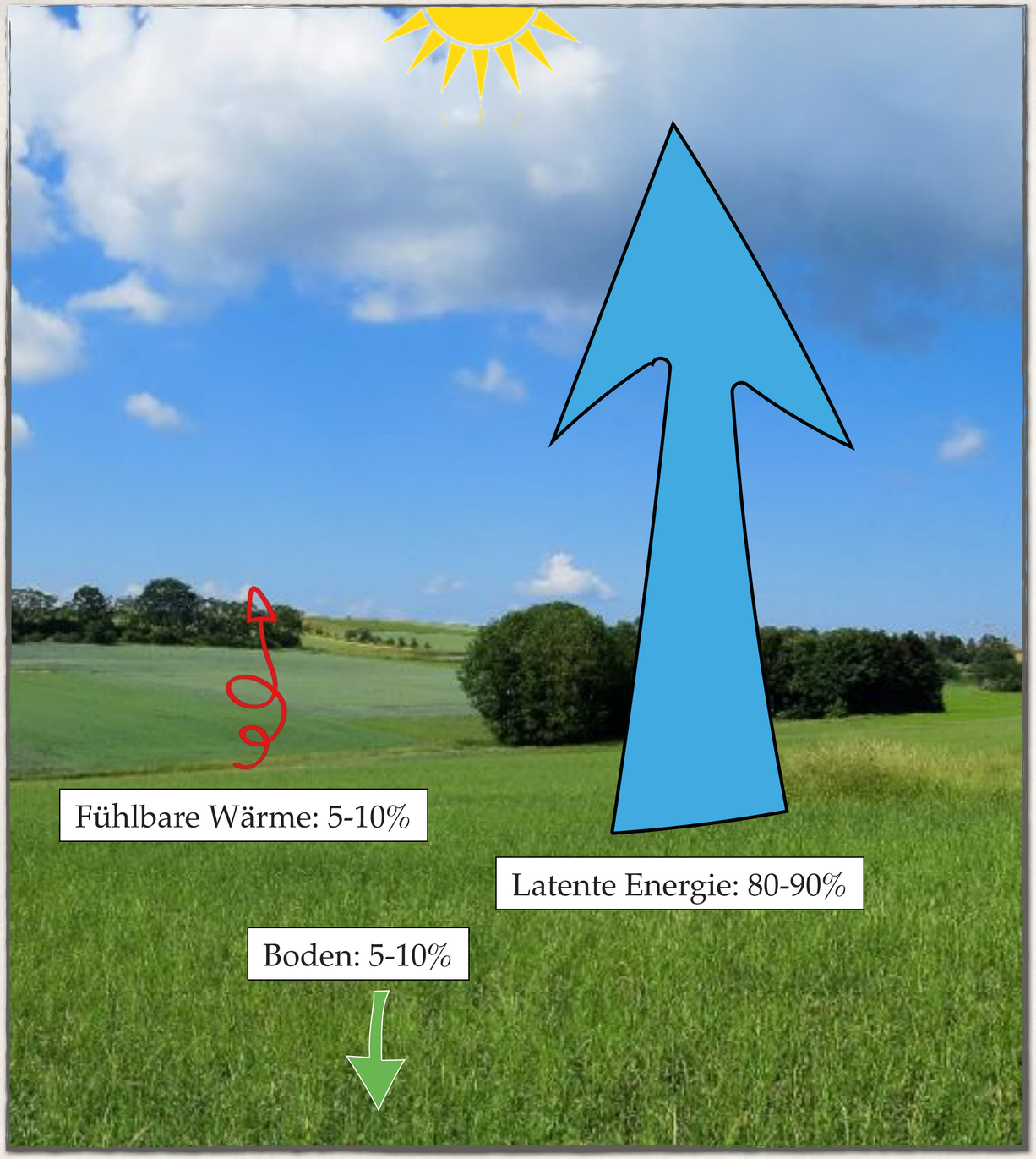

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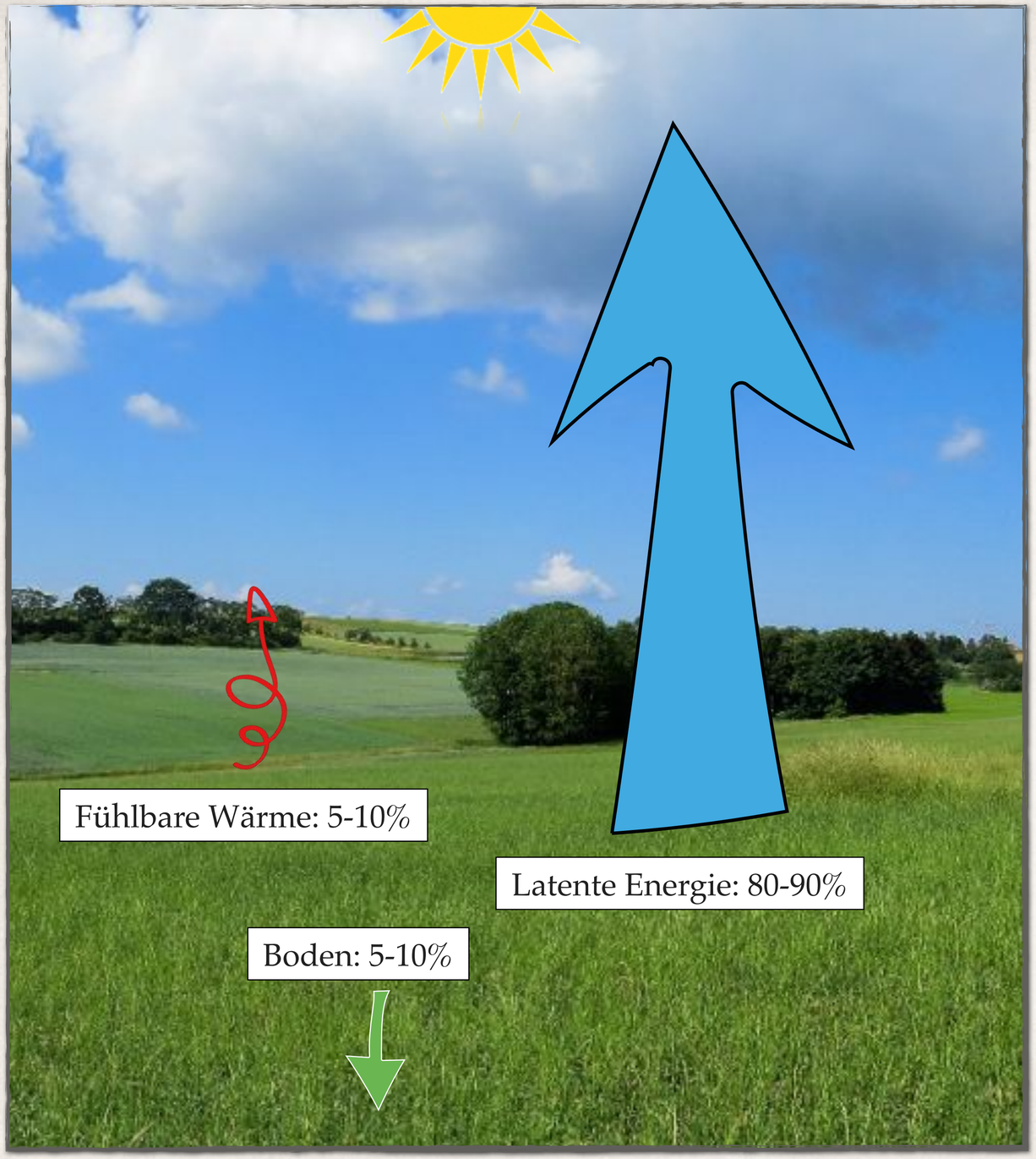

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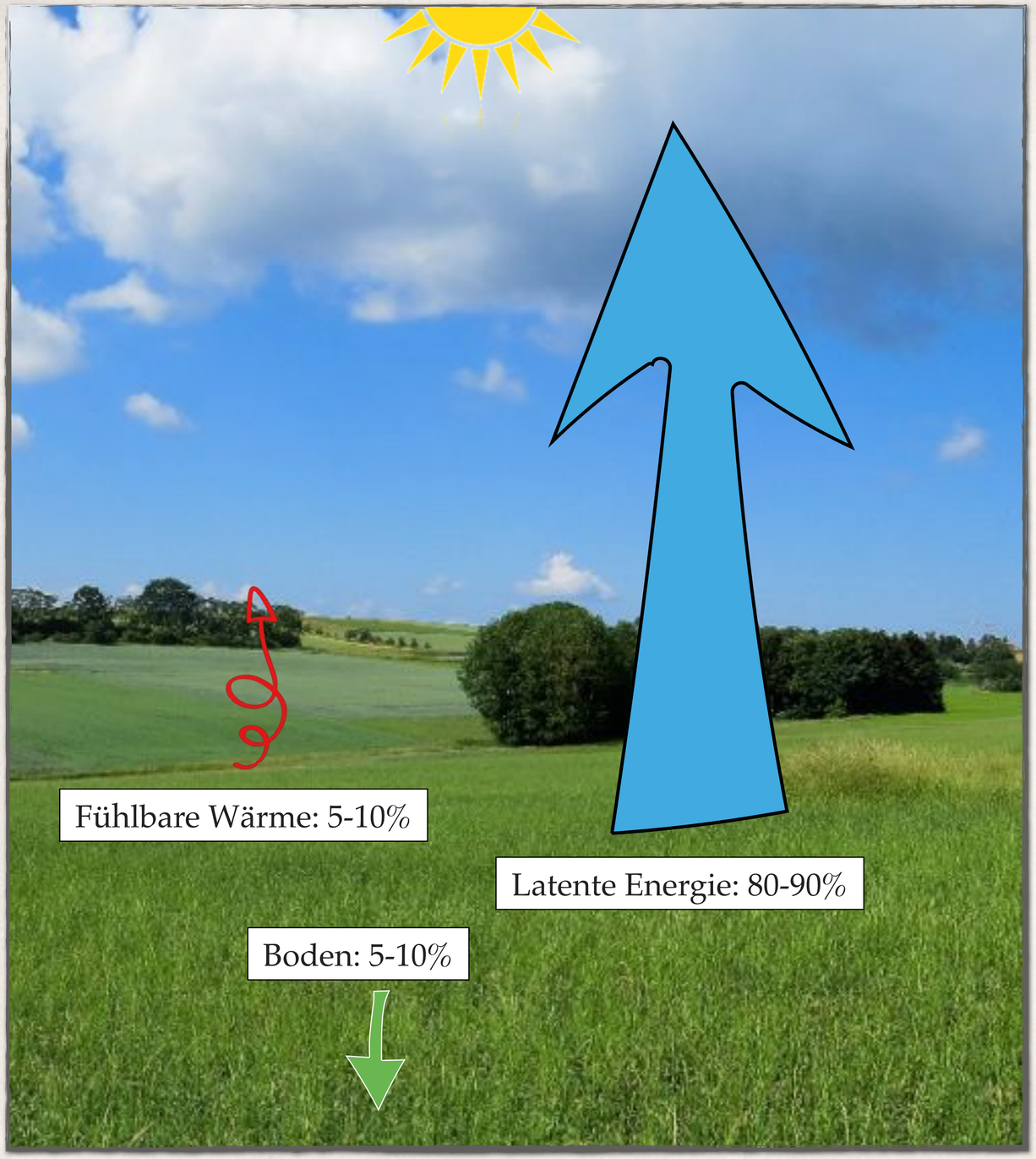

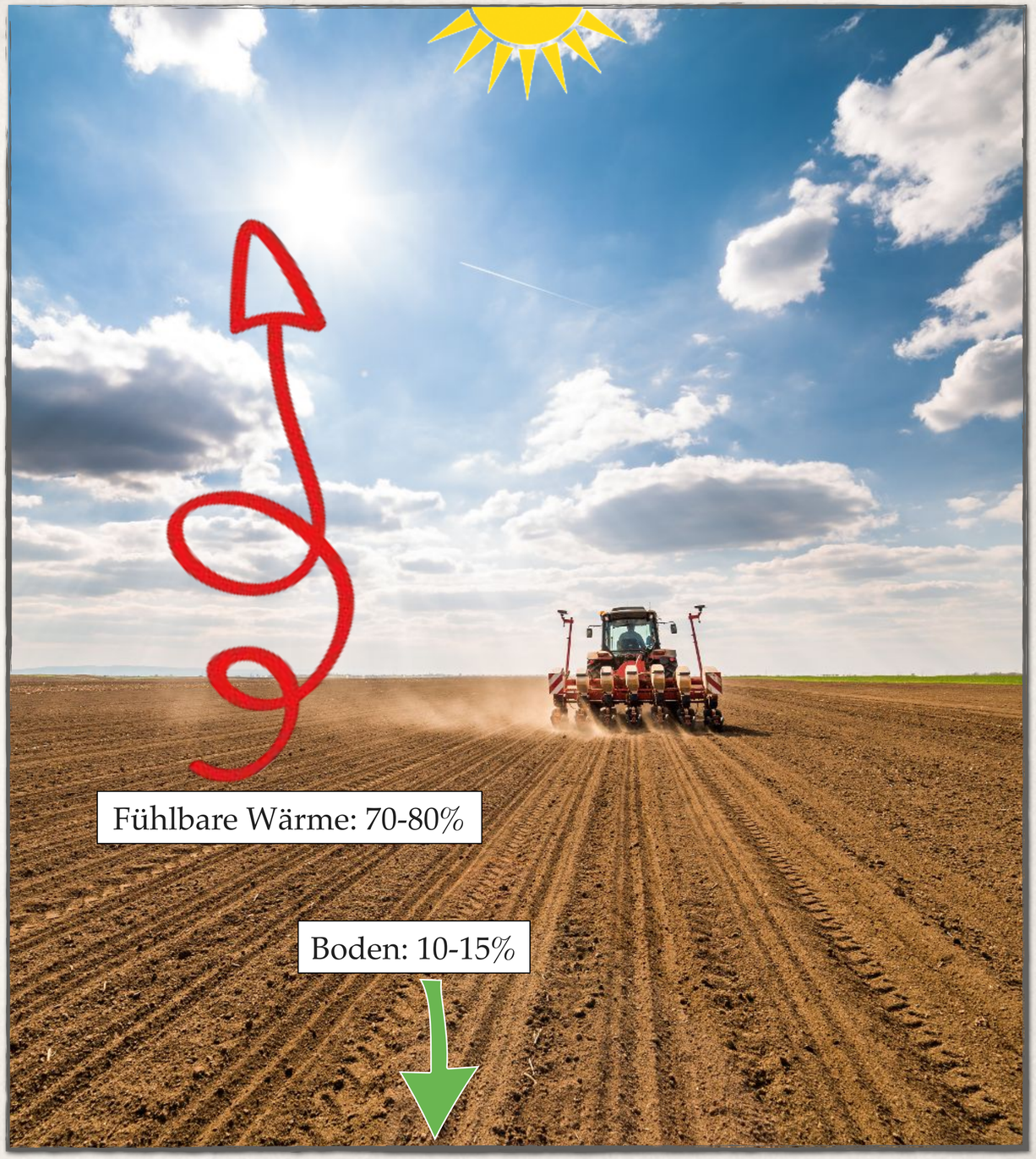

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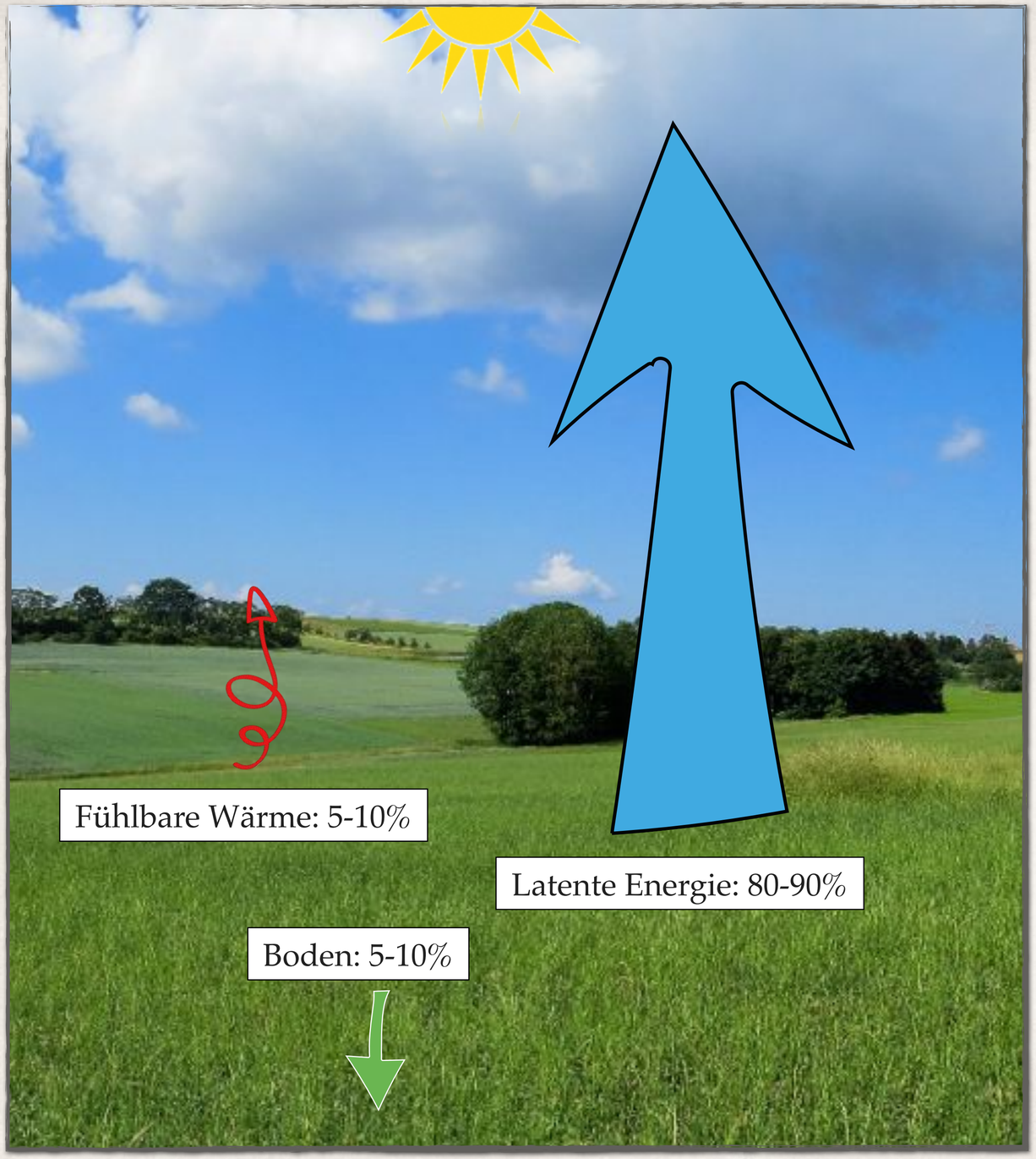

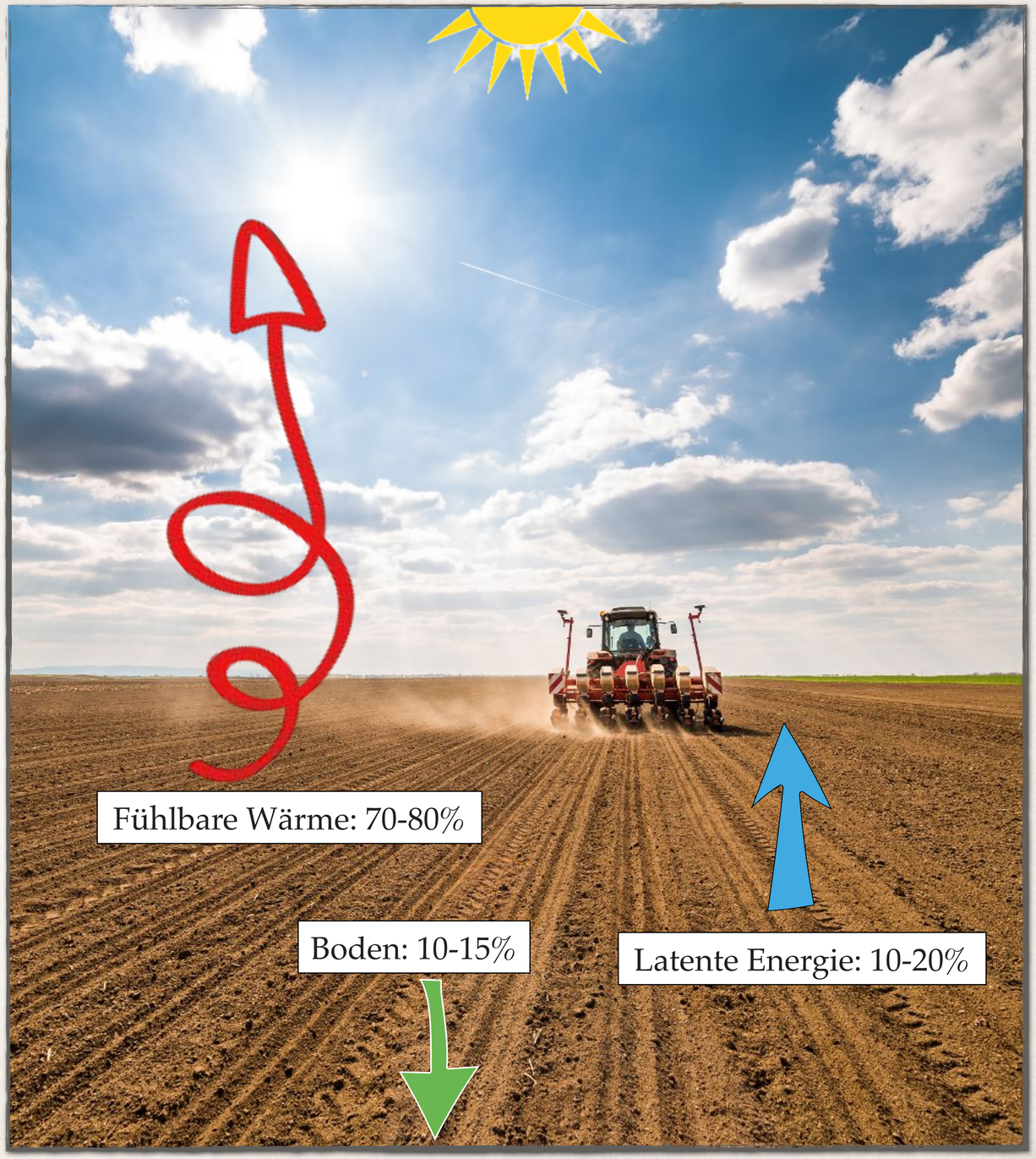

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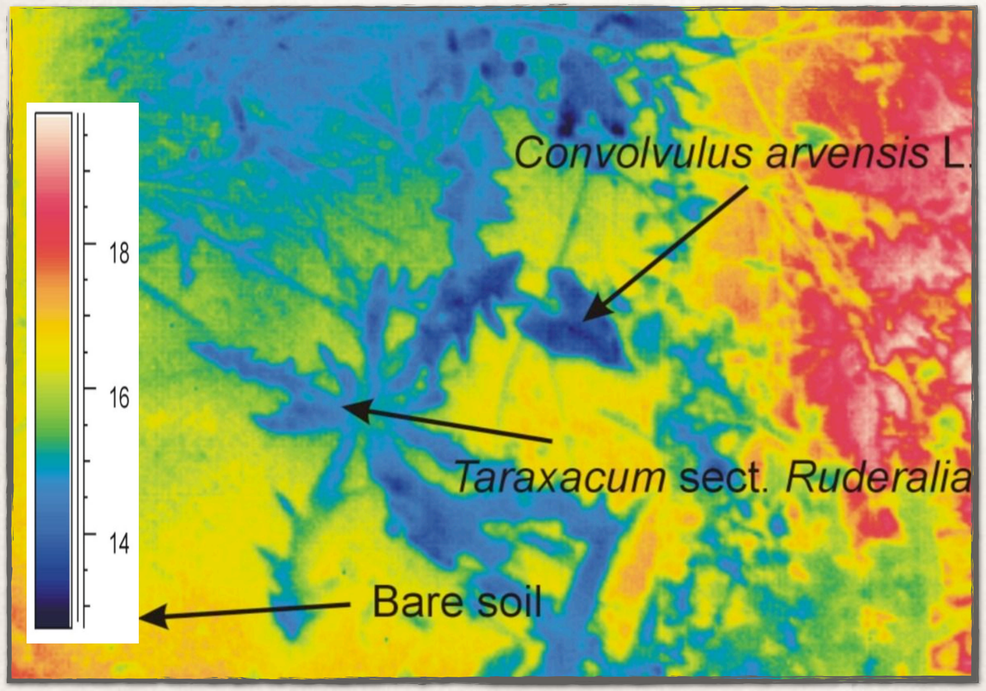

Kravčík, M., Pokorný, J., Kohutiar, J., Kováč, M., Tóth, E., 2007. Water for the Recovery of the Climate - A New Water Paradigm

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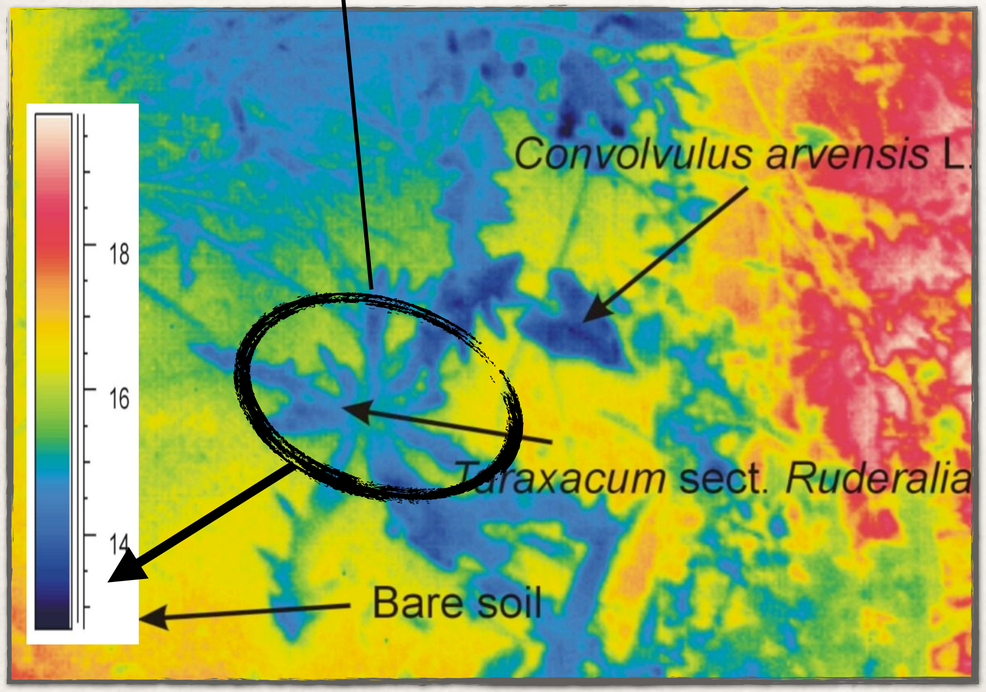

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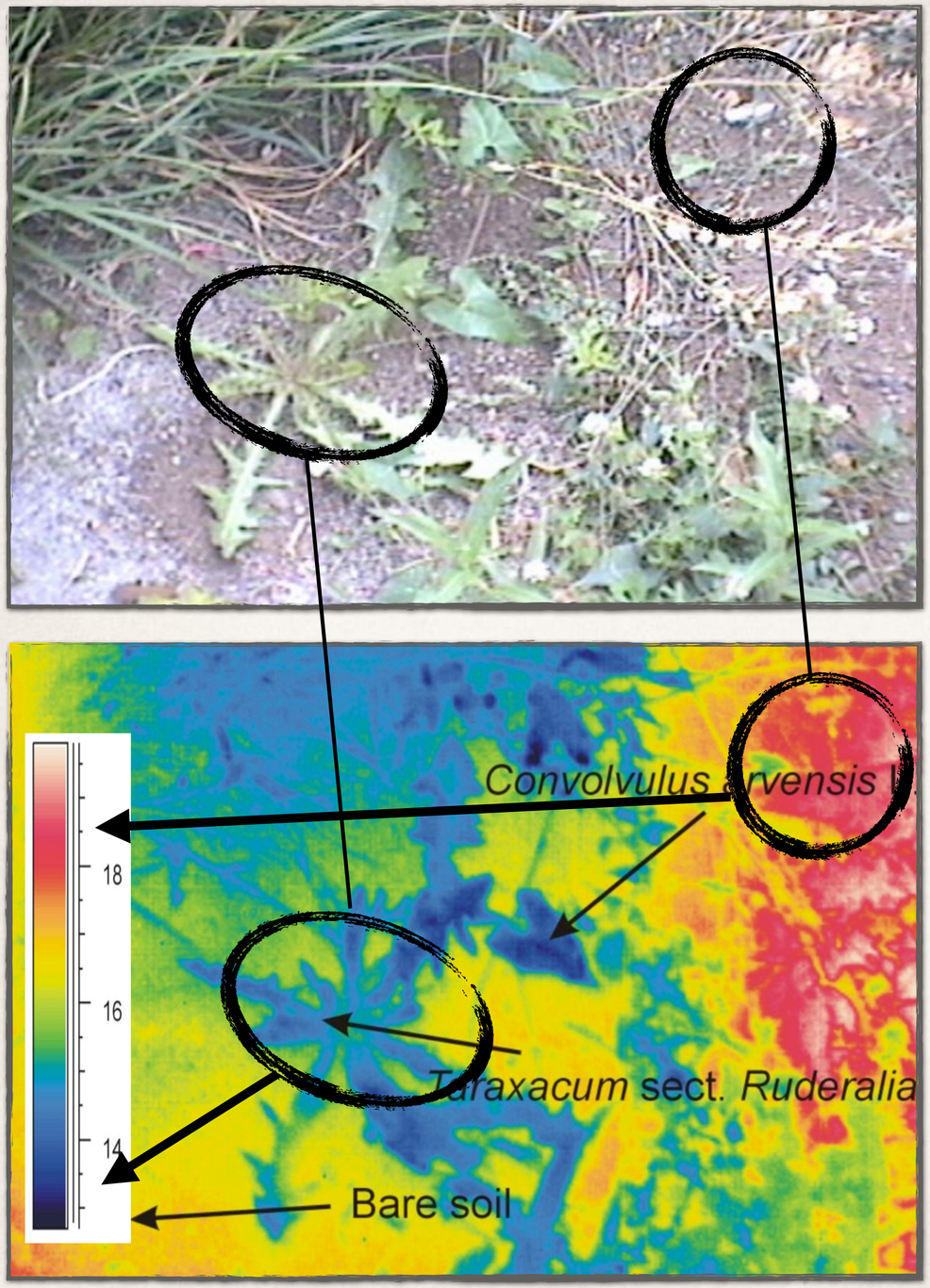

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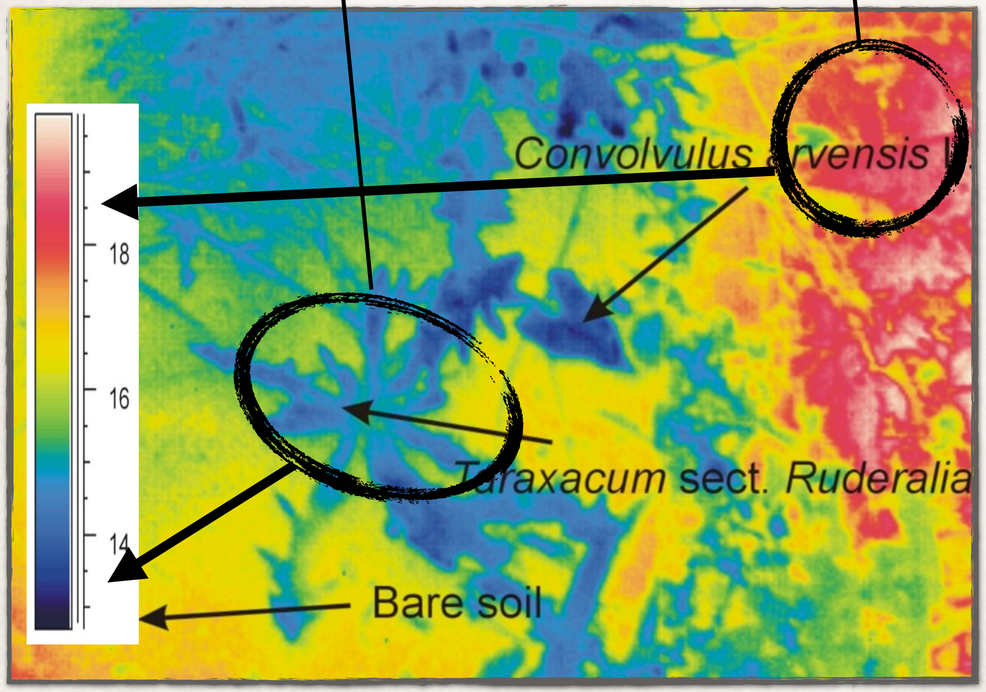

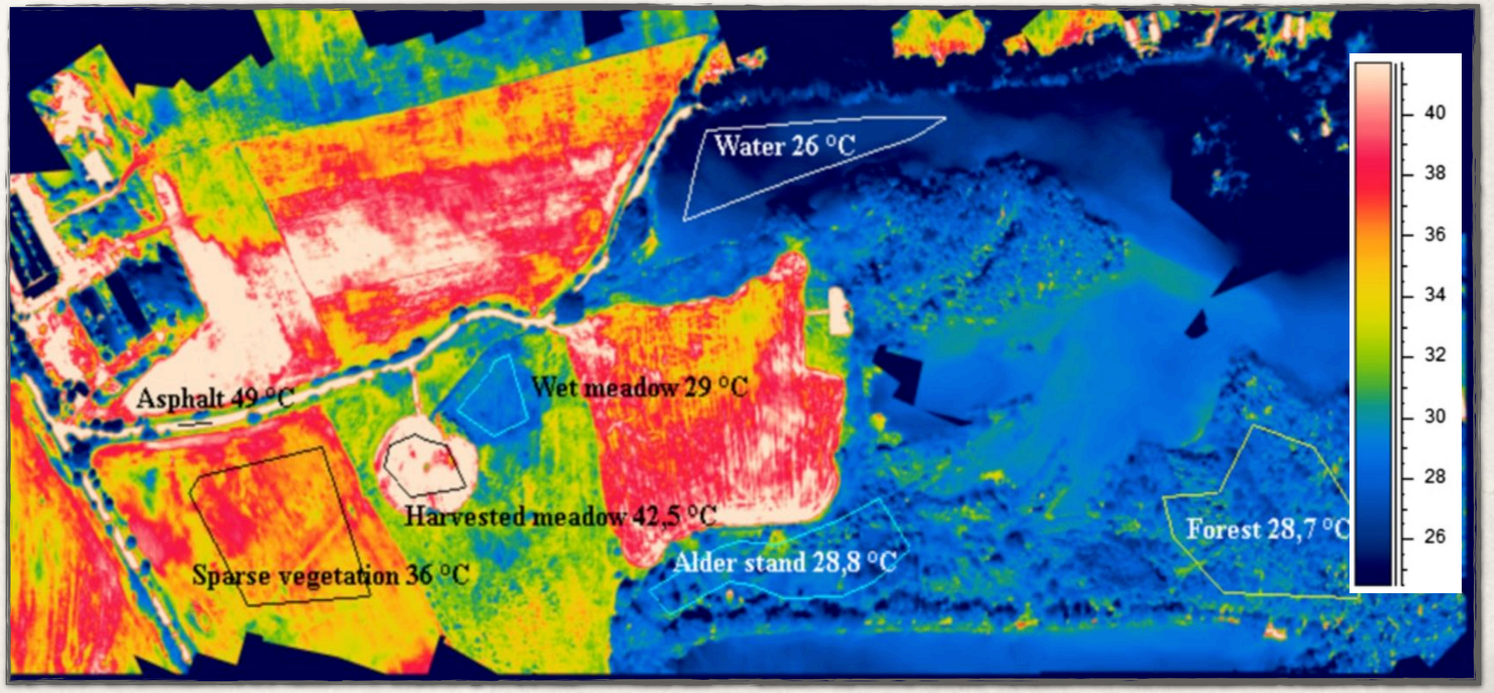

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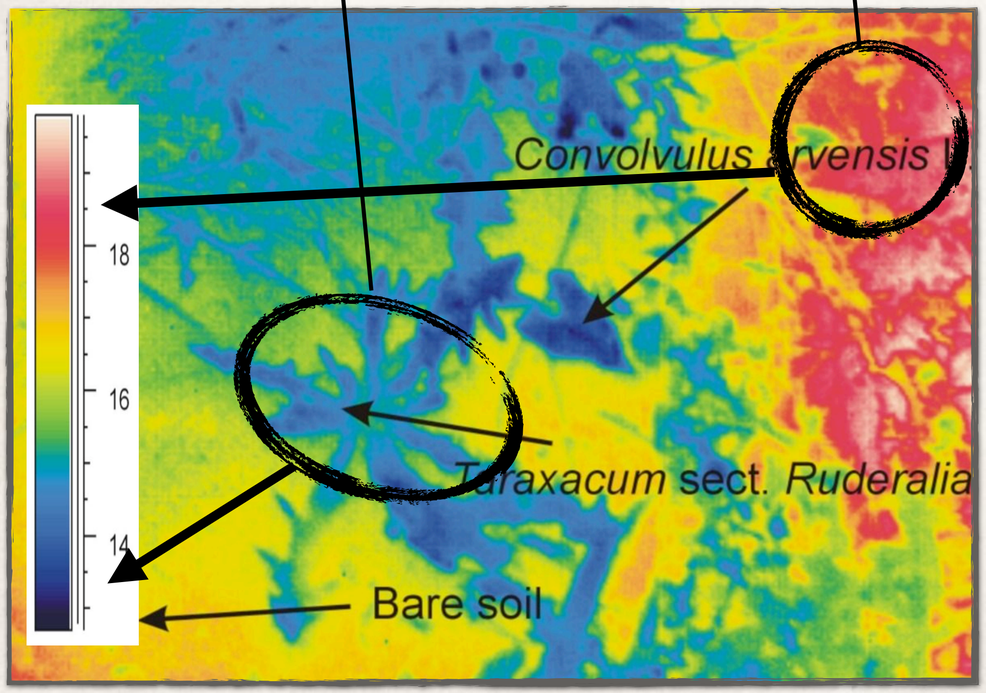

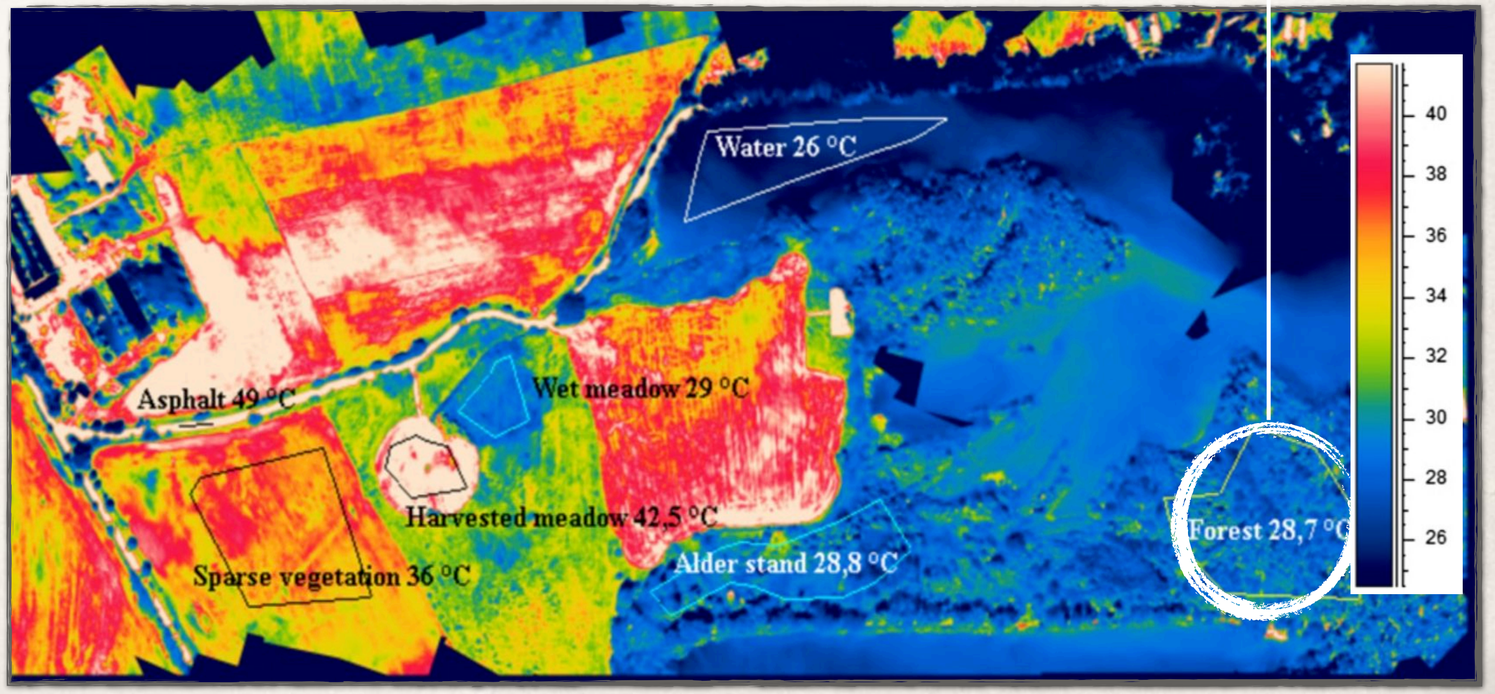

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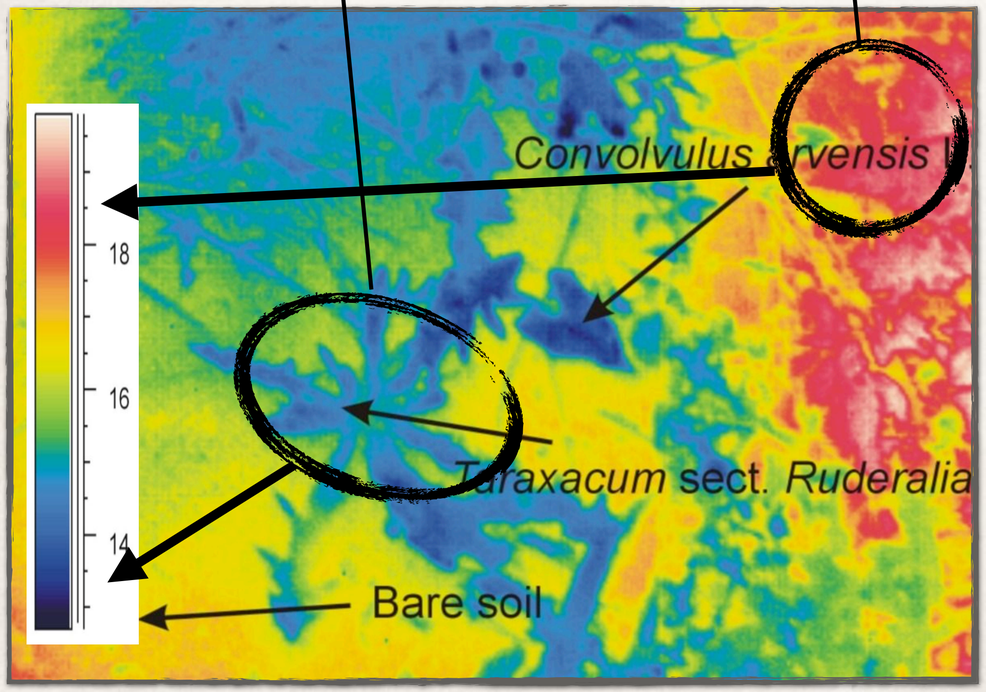

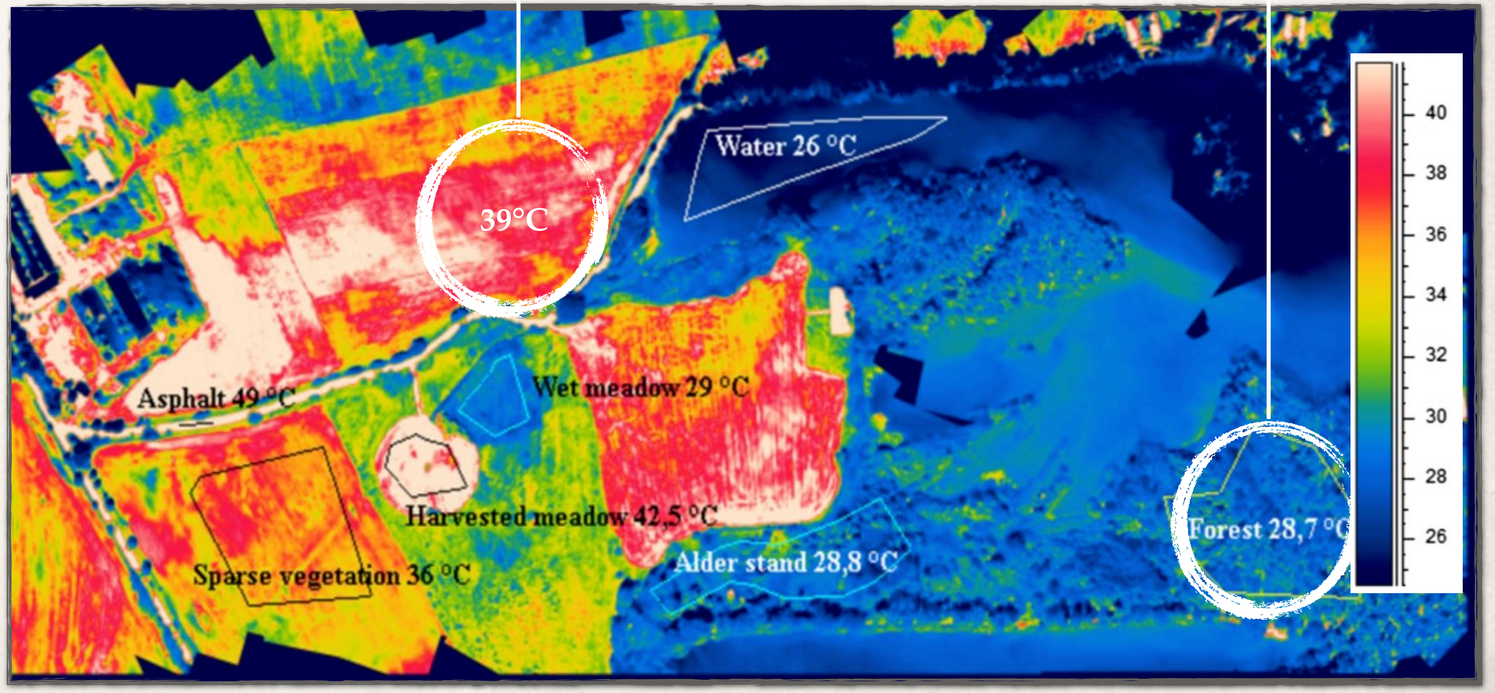

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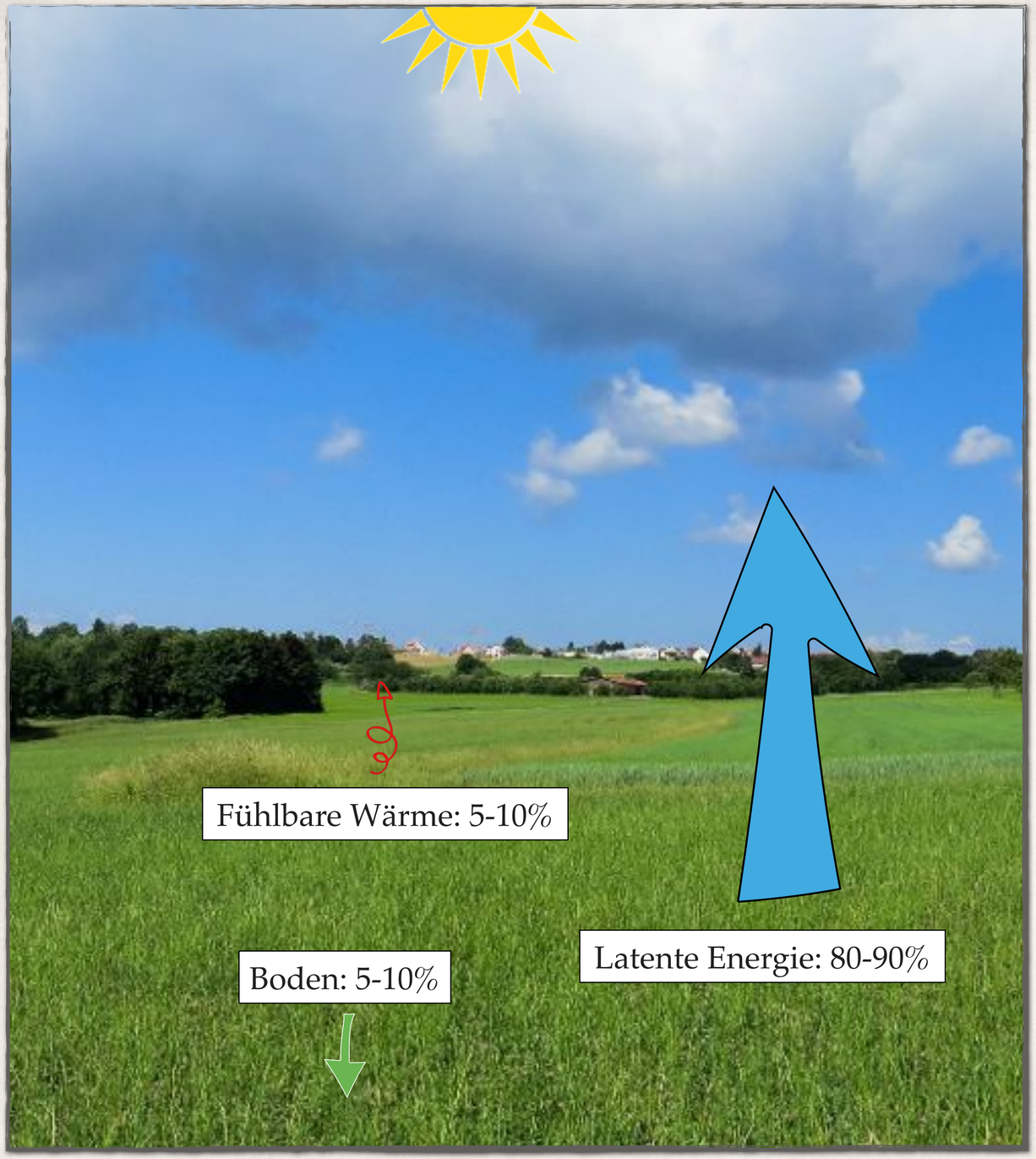
Pokorny, J., 2019. Evapotranspiration, in: Encyclopedia of Ecology. Elsevier, pp. 292–303.

01.08.2022, Lufttemperatur: 37°C



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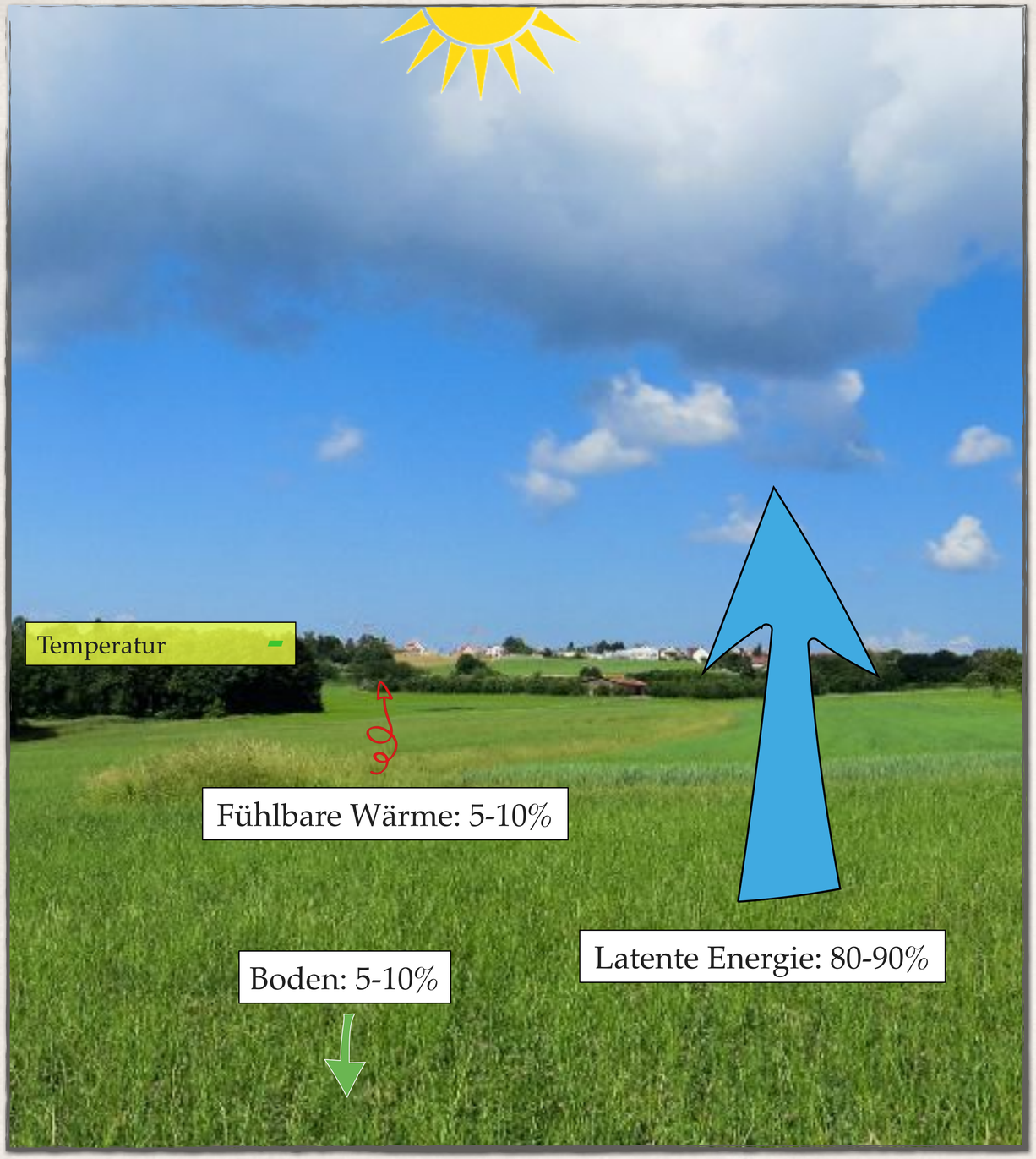

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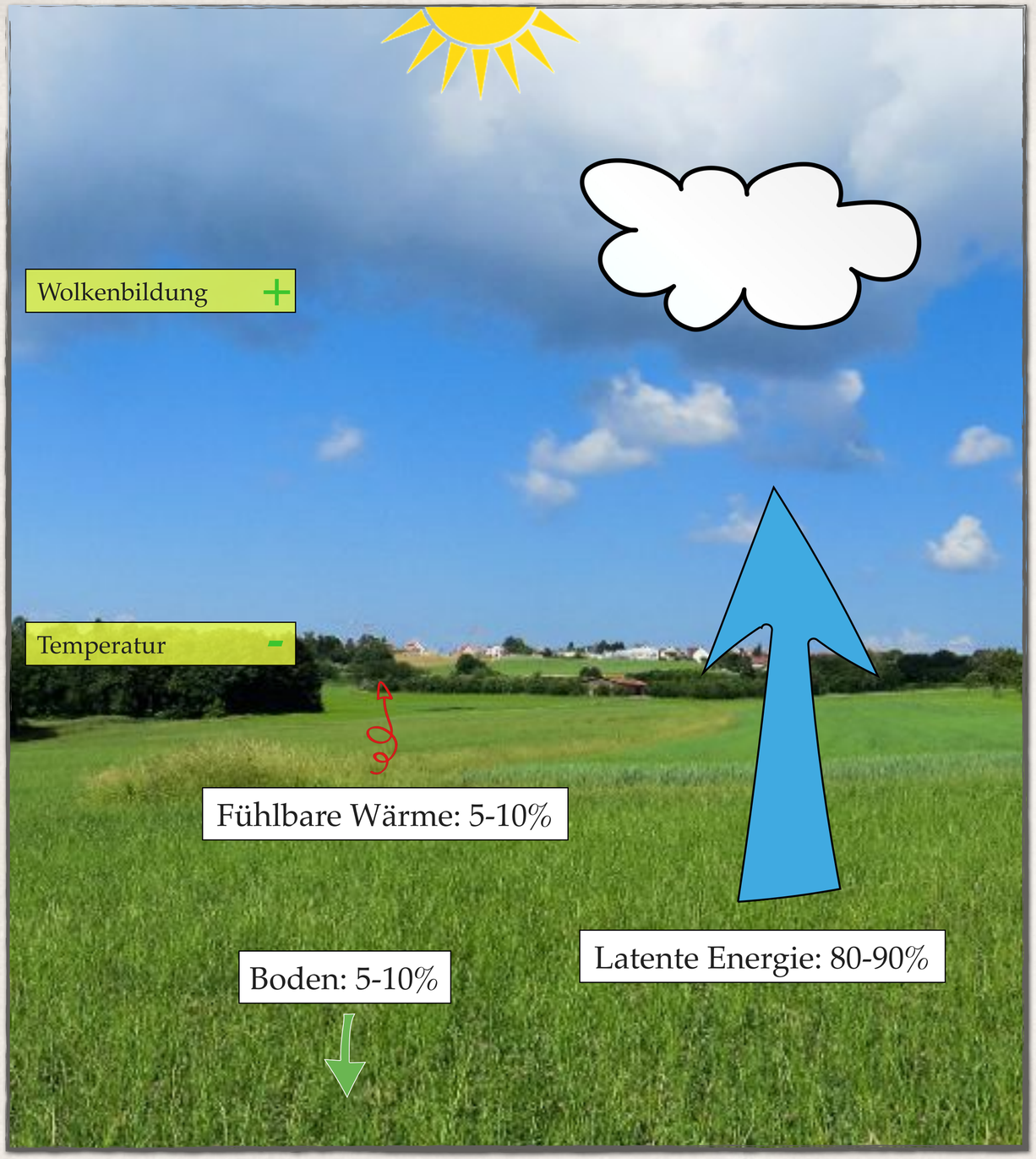

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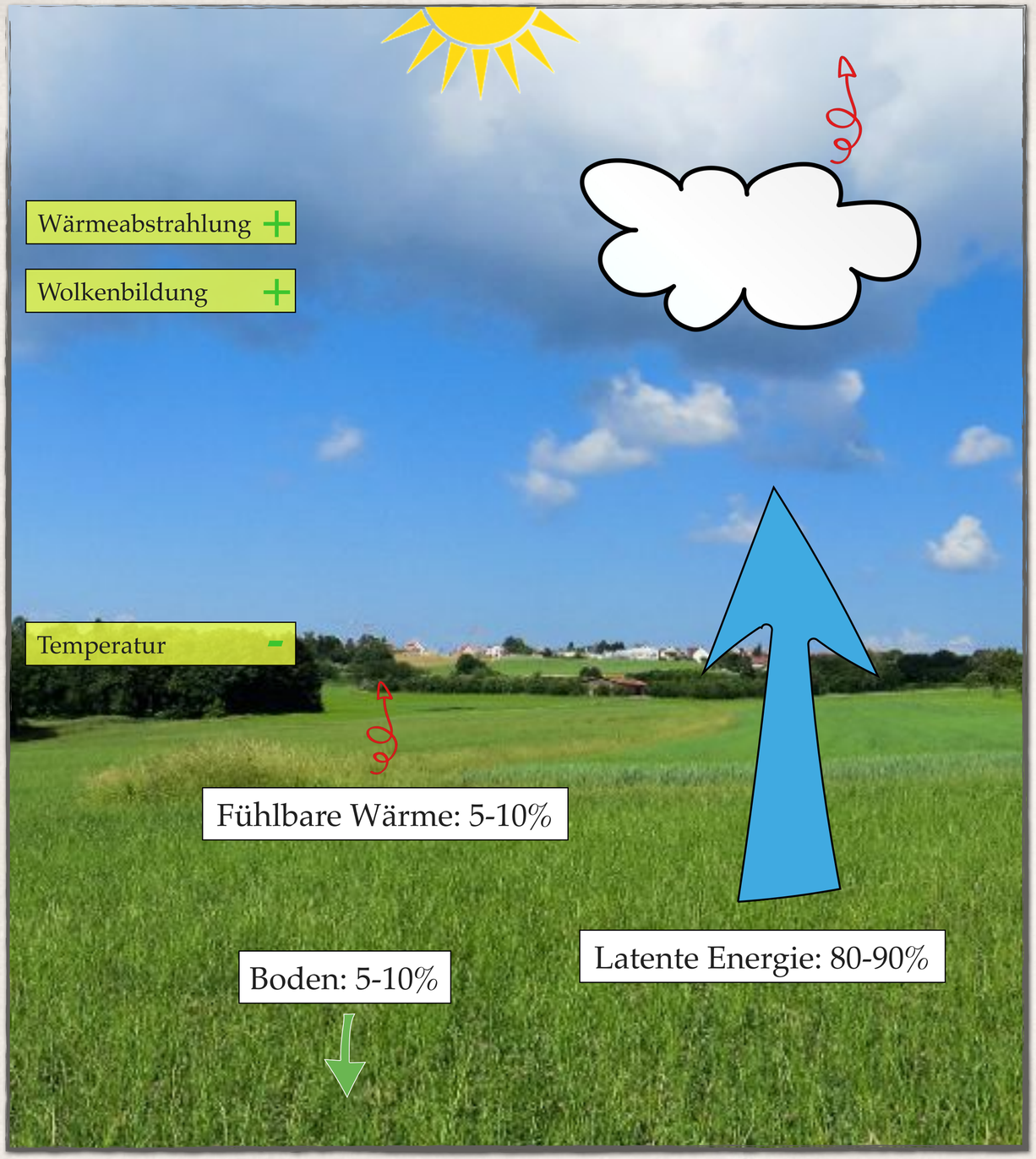


Pokorny, J., 2019. Evapotranspiration, in: Encyclopedia of Ecology. Elsevier, pp. 292–303

Reflektion +

Wärmeabstrahlung +

Wolkenbildung +

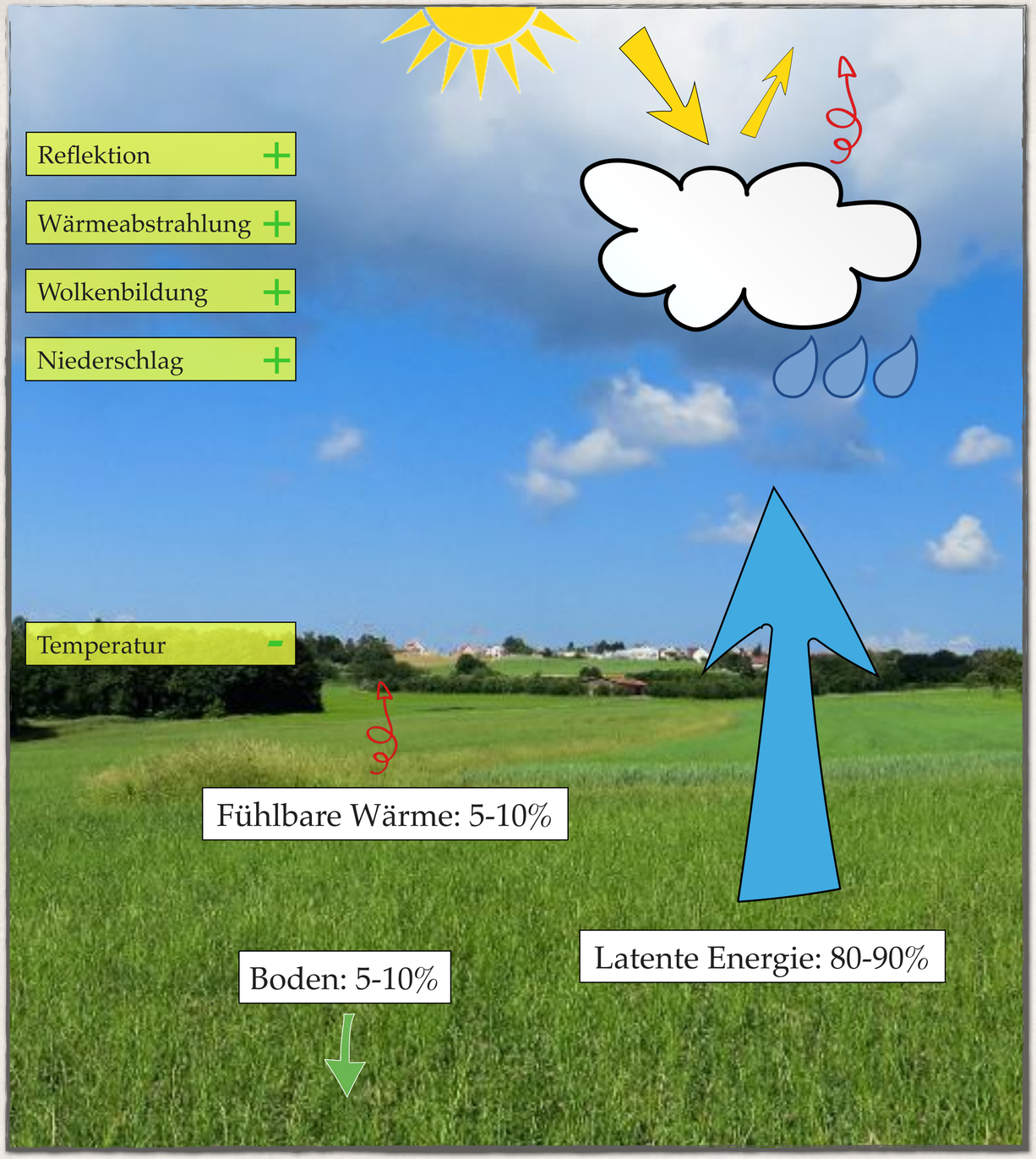
Temperatur -

Fühlbare Wärme: 5-10%

Latente Energie: 80-90%

Boden: 5-10%

Pokorny, J., 2019. Evapotranspiration, in: Encyclopedia of Ecology. Elsevier, pp. 292–303



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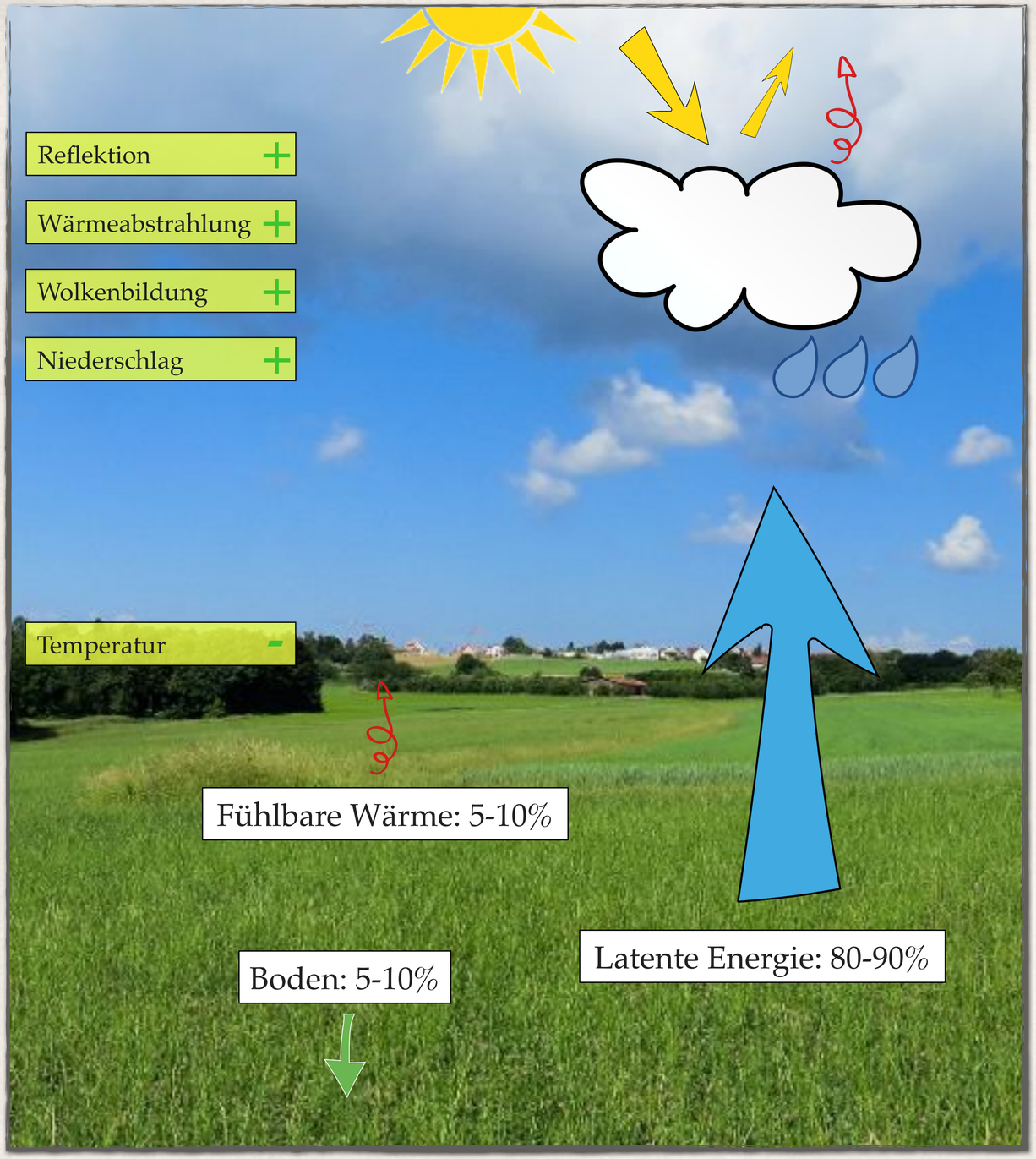

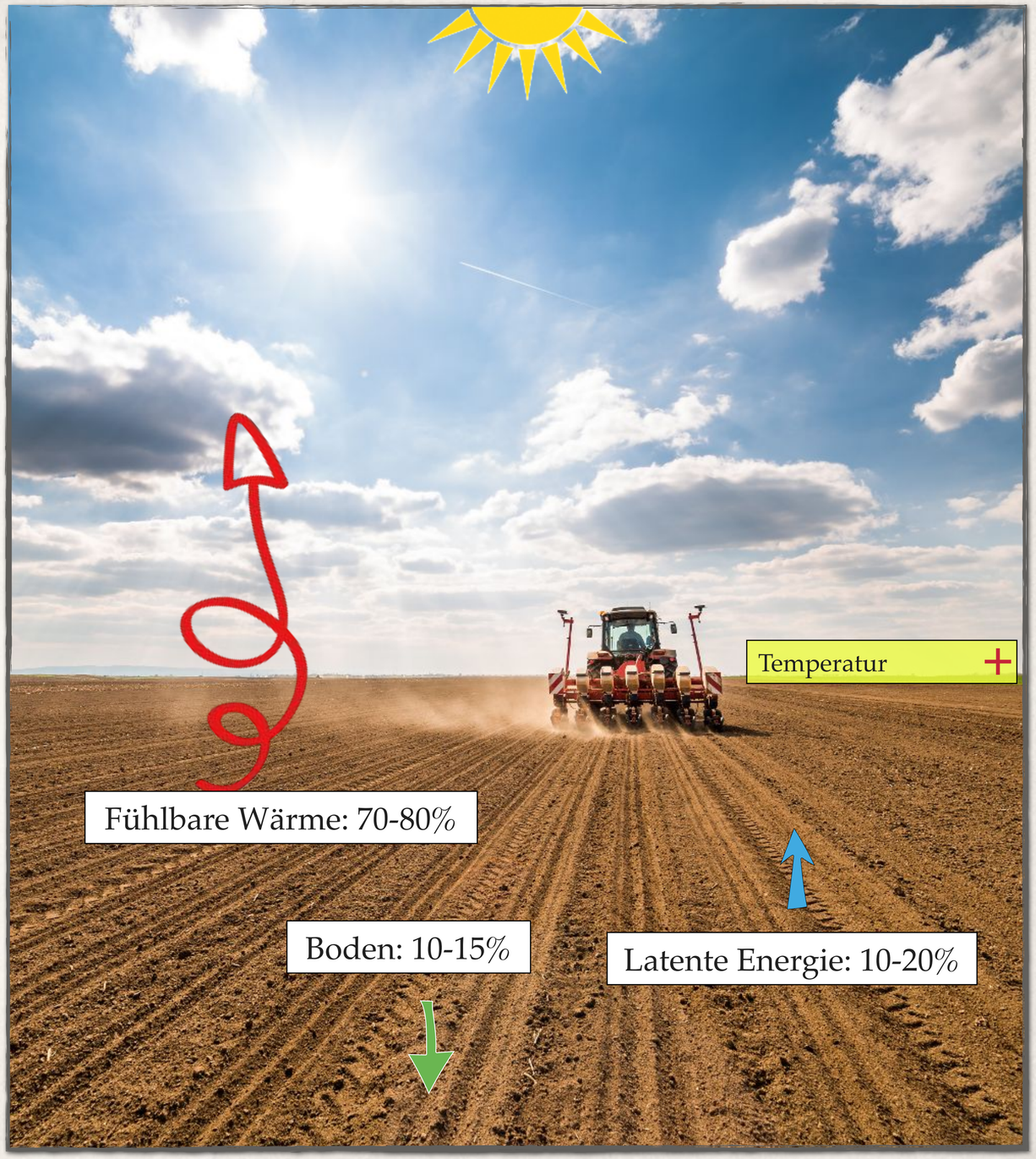

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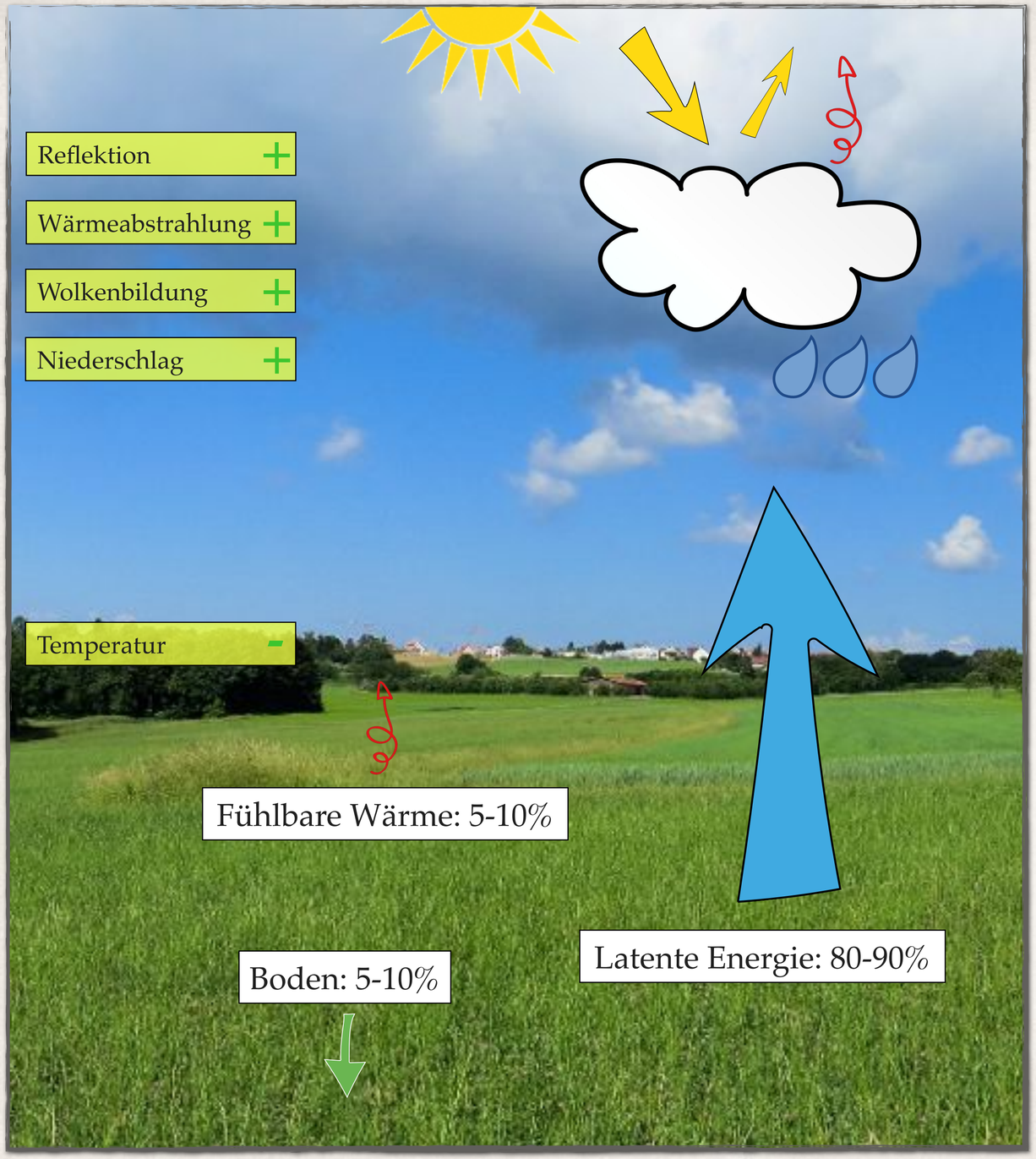

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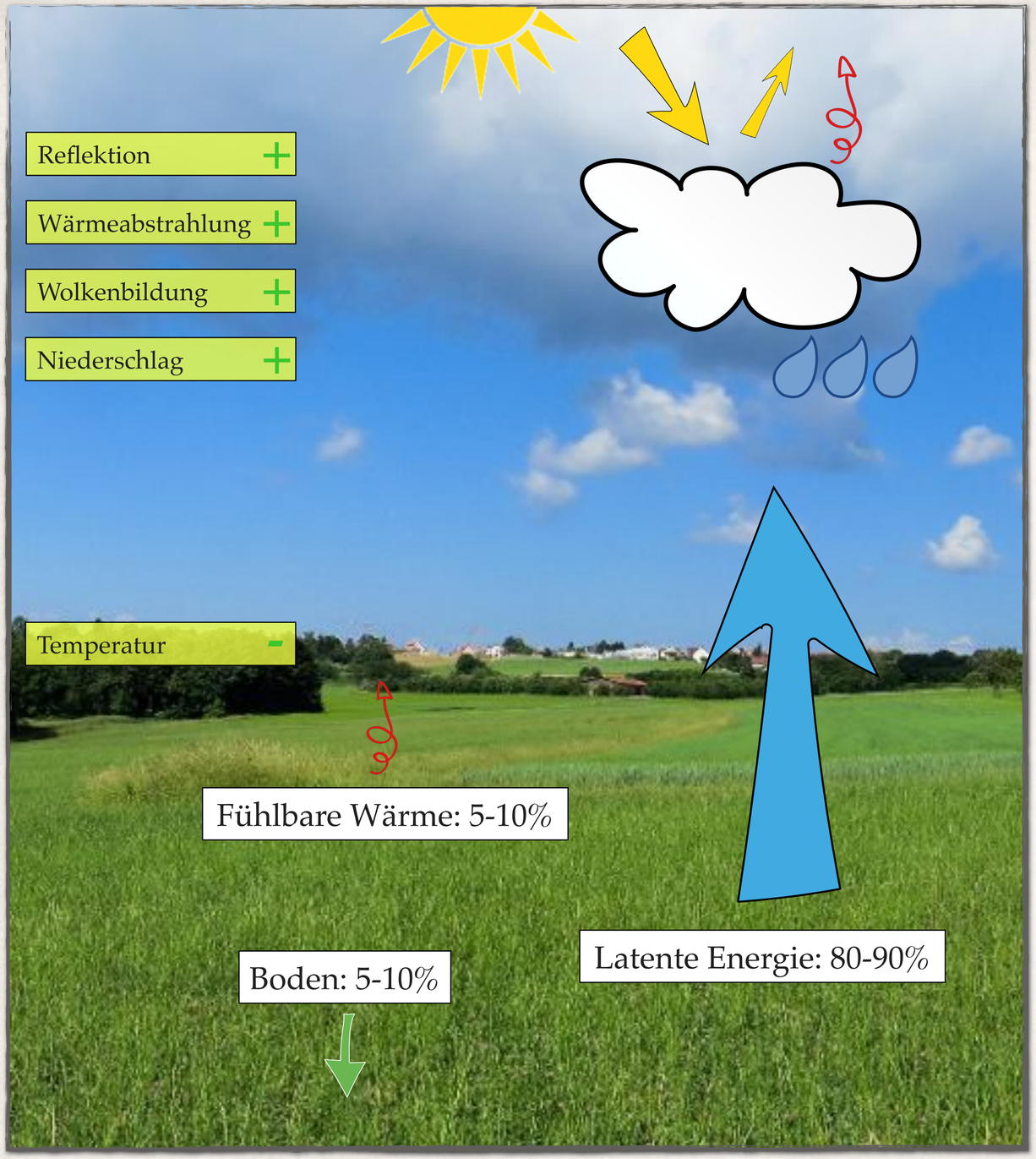

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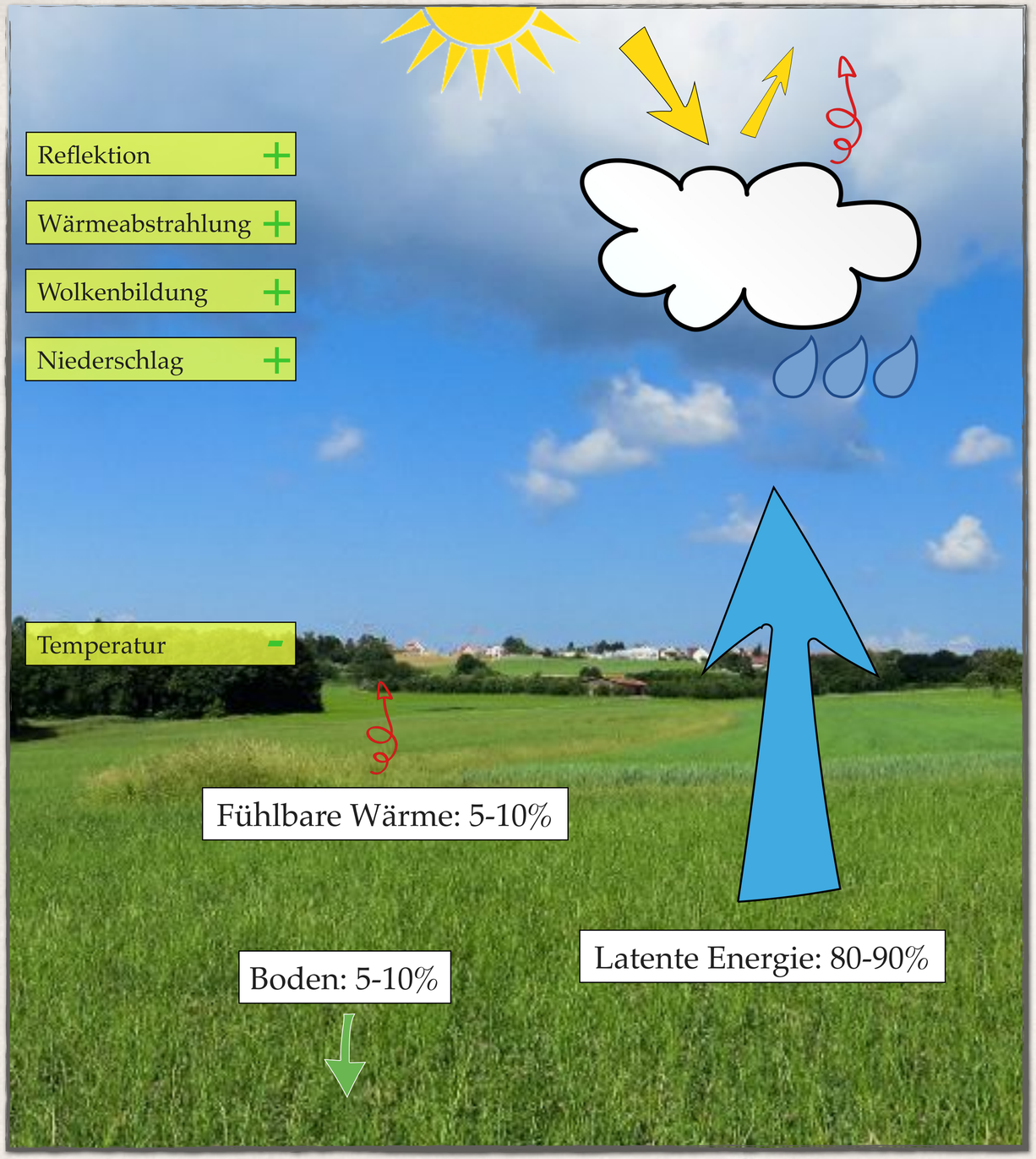

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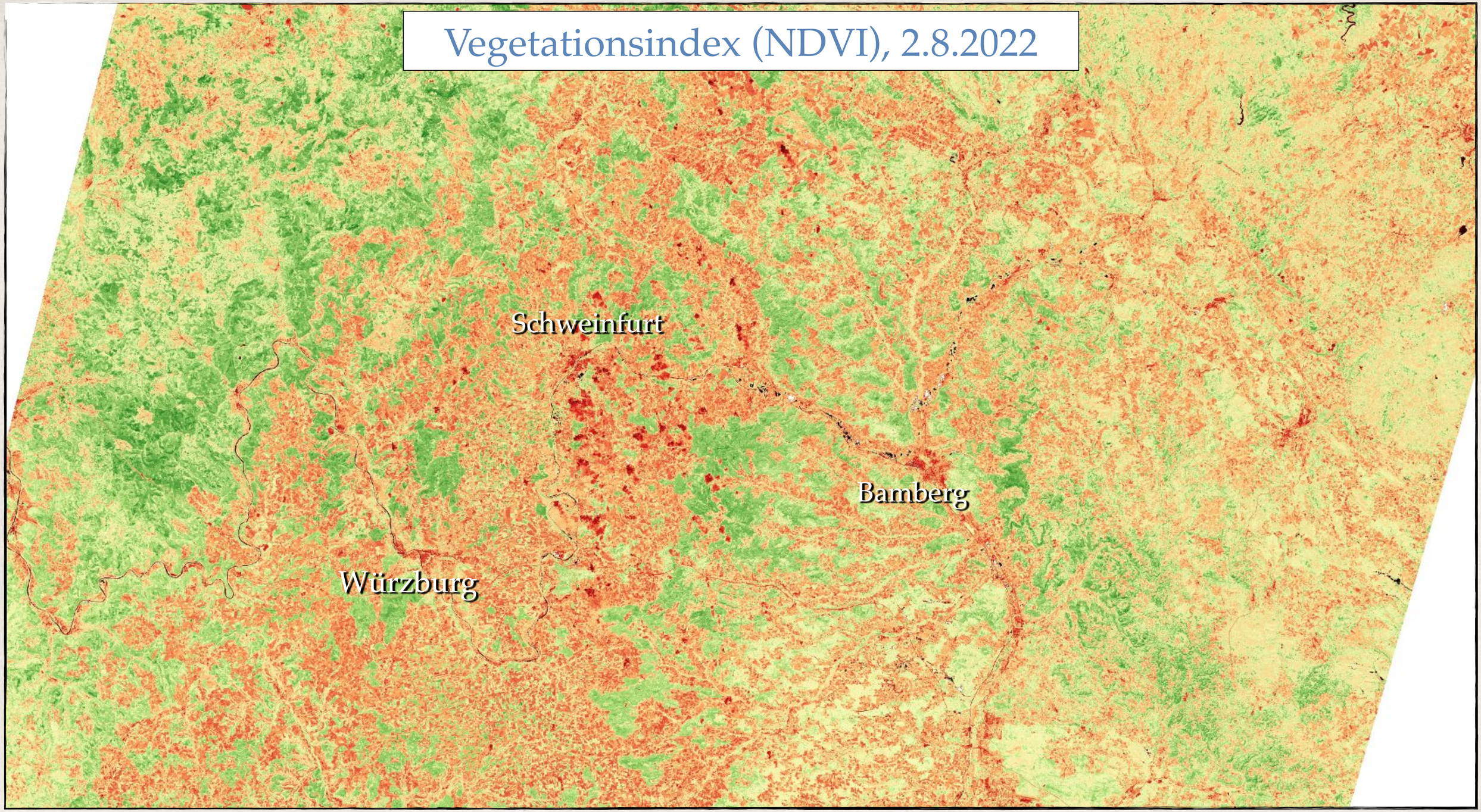
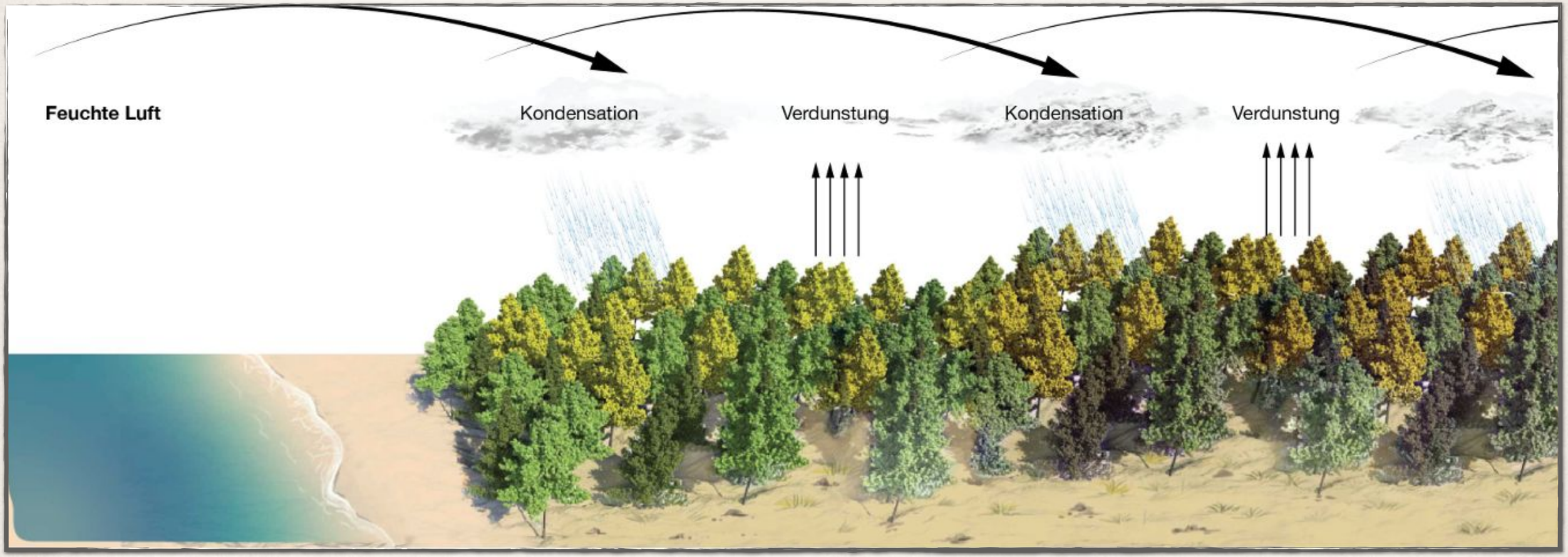
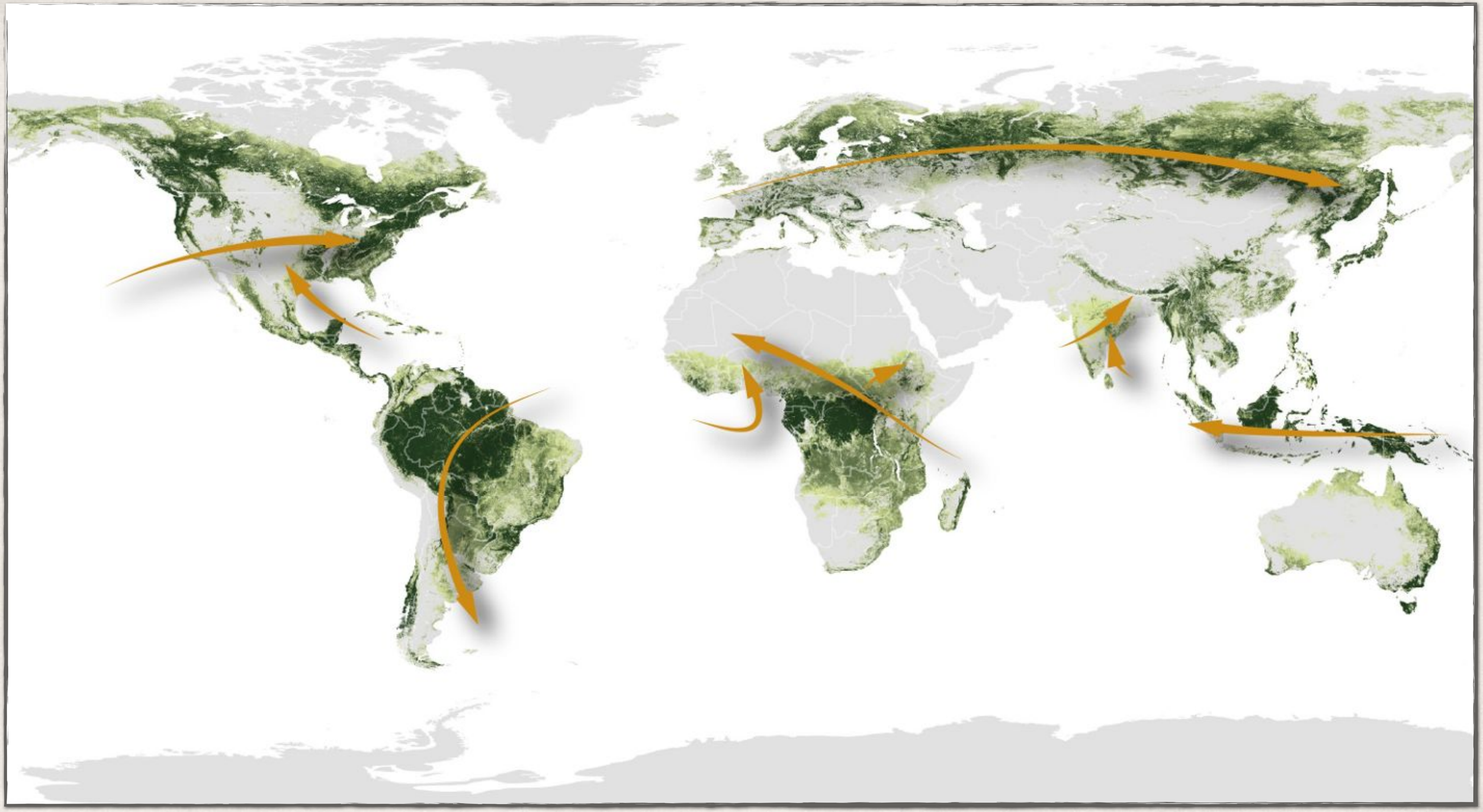
Vegetationsindex (NDVI), 2.8.2022



Lyons, T. J. Clouds prefer native vegetation. *Meteorology and Atmospheric Physics* **80**, 131–140 (2002).

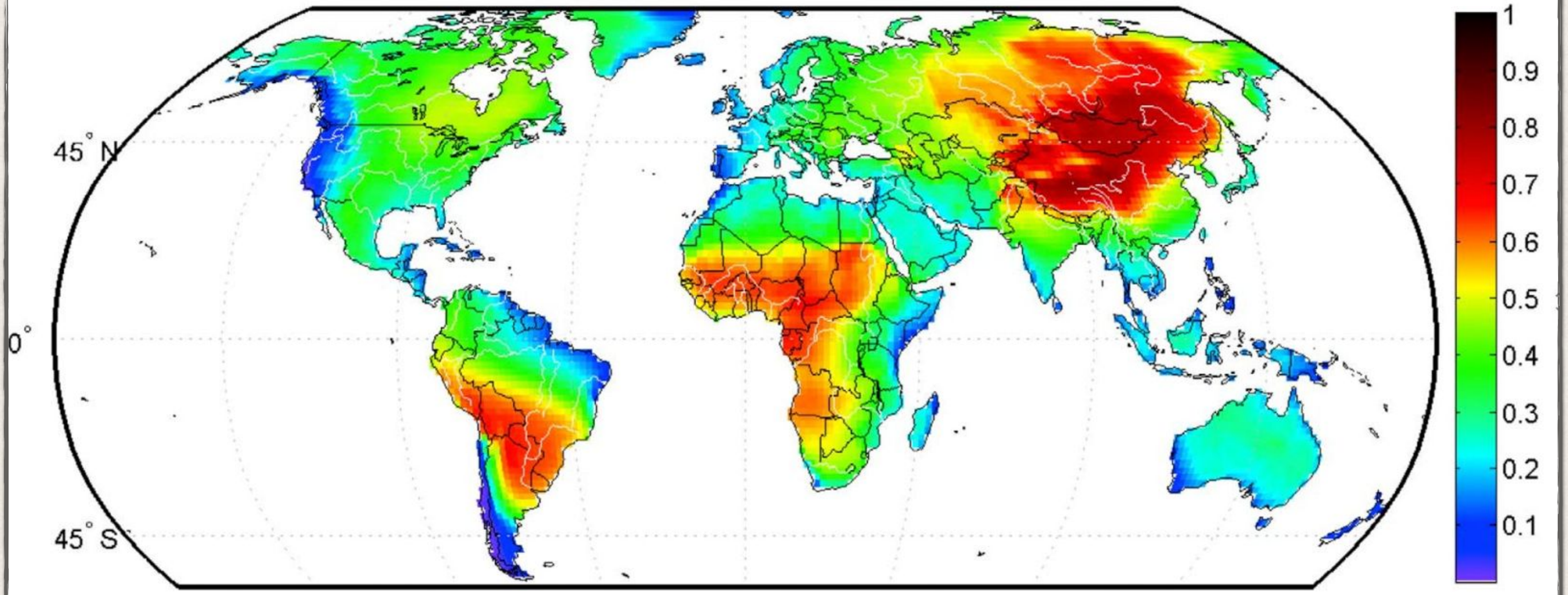


Graphic: https://www.sciencemag.org/news/2020/06/controversial-russian-theory-claims-forests-don-t-just-make-rain-they-make-wind



van der Ent, R. J., Savenije, H. H. G., Schaefli, B. & Steele-Dunne, S. C. Origin and fate of atmospheric moisture over continents. *Water Resources Research* **46**, (2010).

Niederschlags-Recycling-Verhältnis



1999-2008

van der Ent, R. J., Savenije, H. H. G., Schaefli, B. & Steele-Dunne, S. C. Origin and fate of atmospheric moisture over continents. *Water Resources Research* **46**, (2010).

Trockenheit in Ostdeutschland:

Prof. Dr. Dietrich Borchardt, UFZ, Dürre-Monitor

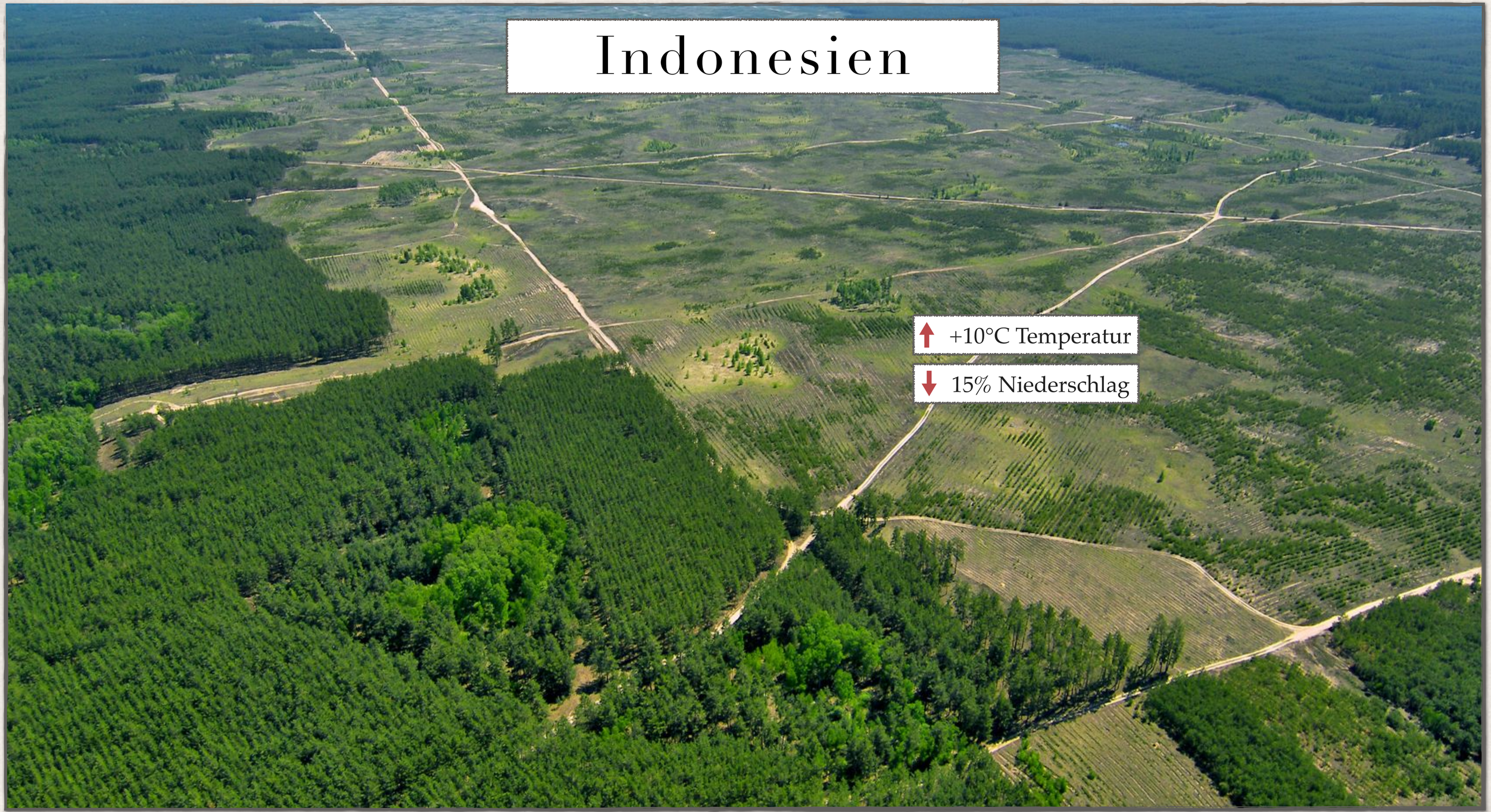
Trockenheit in Ostdeutschland:

50% Klimawandel

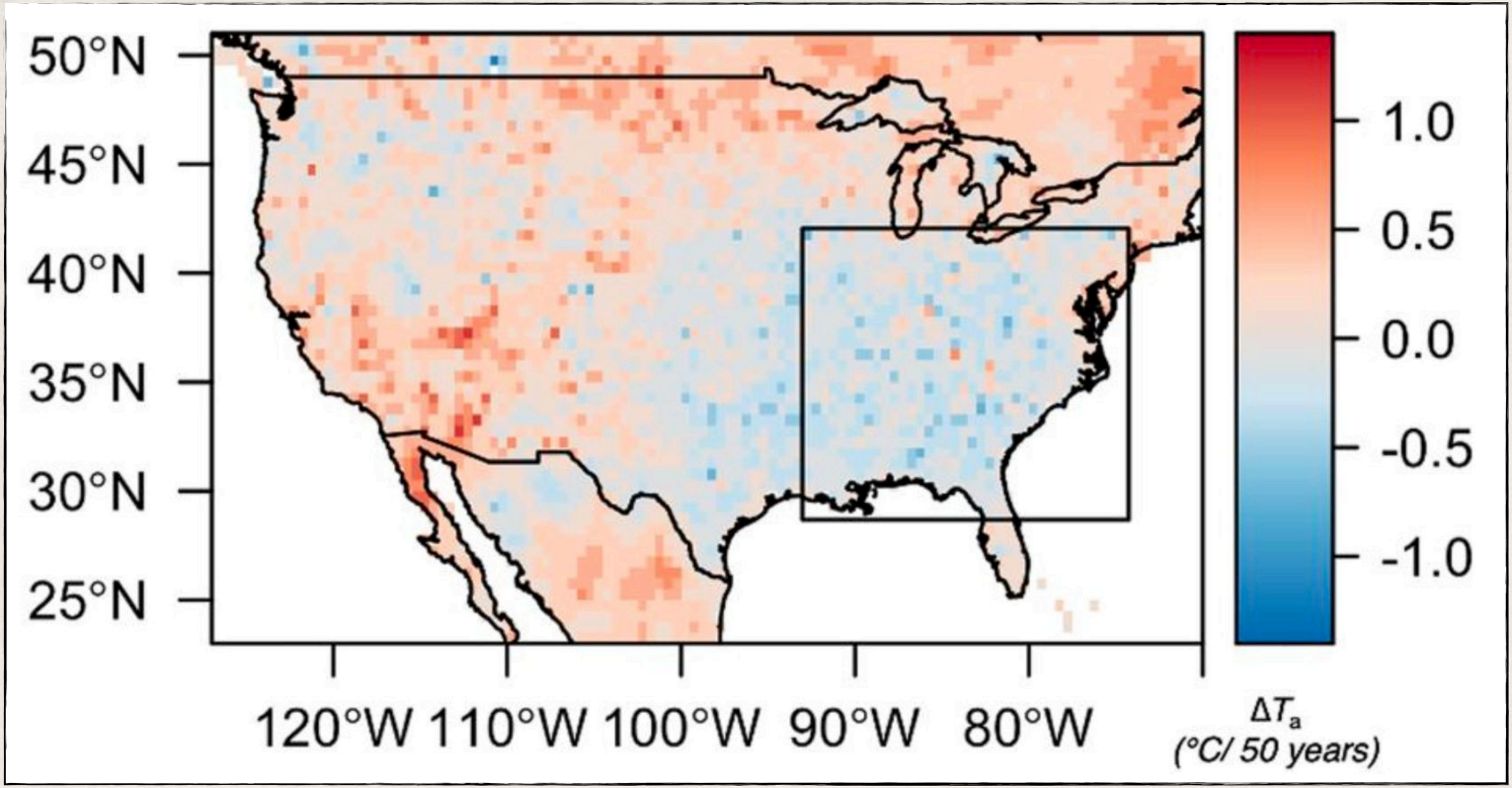
50% falsche Landnutzungsmaßnahmen

Prof. Dr. Dietrich Borchardt, UFZ, Dürre-Monitor

Indonesien

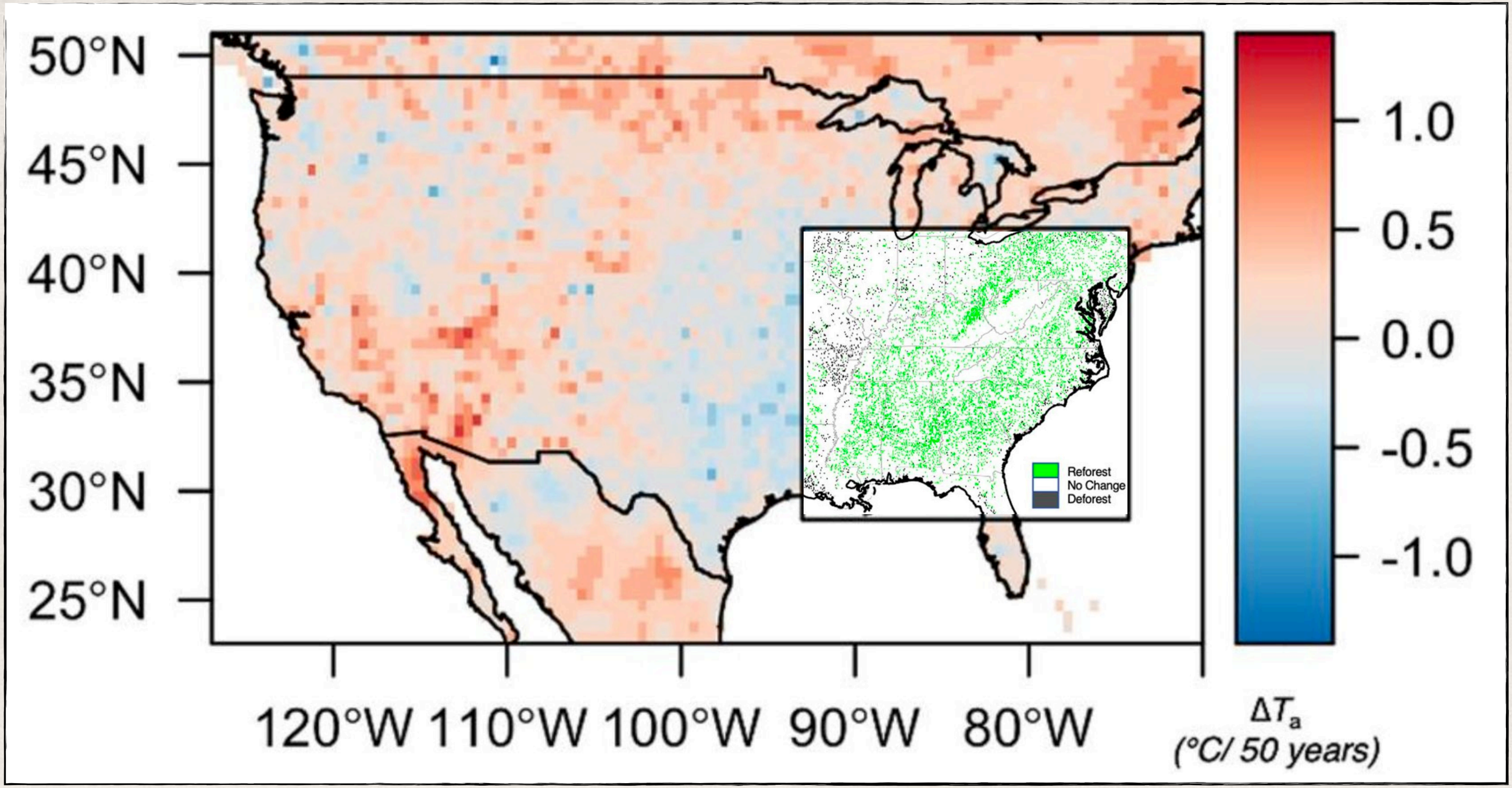


Sabajo, C. R. *et al.* Expansion of oil palm and other cash crops causes an increase of the land surface temperature in the Jambi province in Indonesia. *Biogeosciences* **14**, 4619–4635 (2017)
McAlpine, Clive A et al. 2018. “Forest Loss and Borneo’s Climate.” Environmental Research Letters 13(4): 044009.



Barnes ML, Zhang Q, Robeson SM, Young L, Burakowski EA, Oishi AChristopher, Stoy PC, Katul G, Novick KA (2024) A Century of Reforestation Reduced Anthropogenic Warming in the Eastern United States

Barnes ML, Zhang Q, Robeson SM, Young L, Burakowski EA, Oishi AChristopher, Stoy PC, Katul G, Novick KA (2024) A Century of Reforestation Reduced Anthropogenic Warming in the Eastern United States



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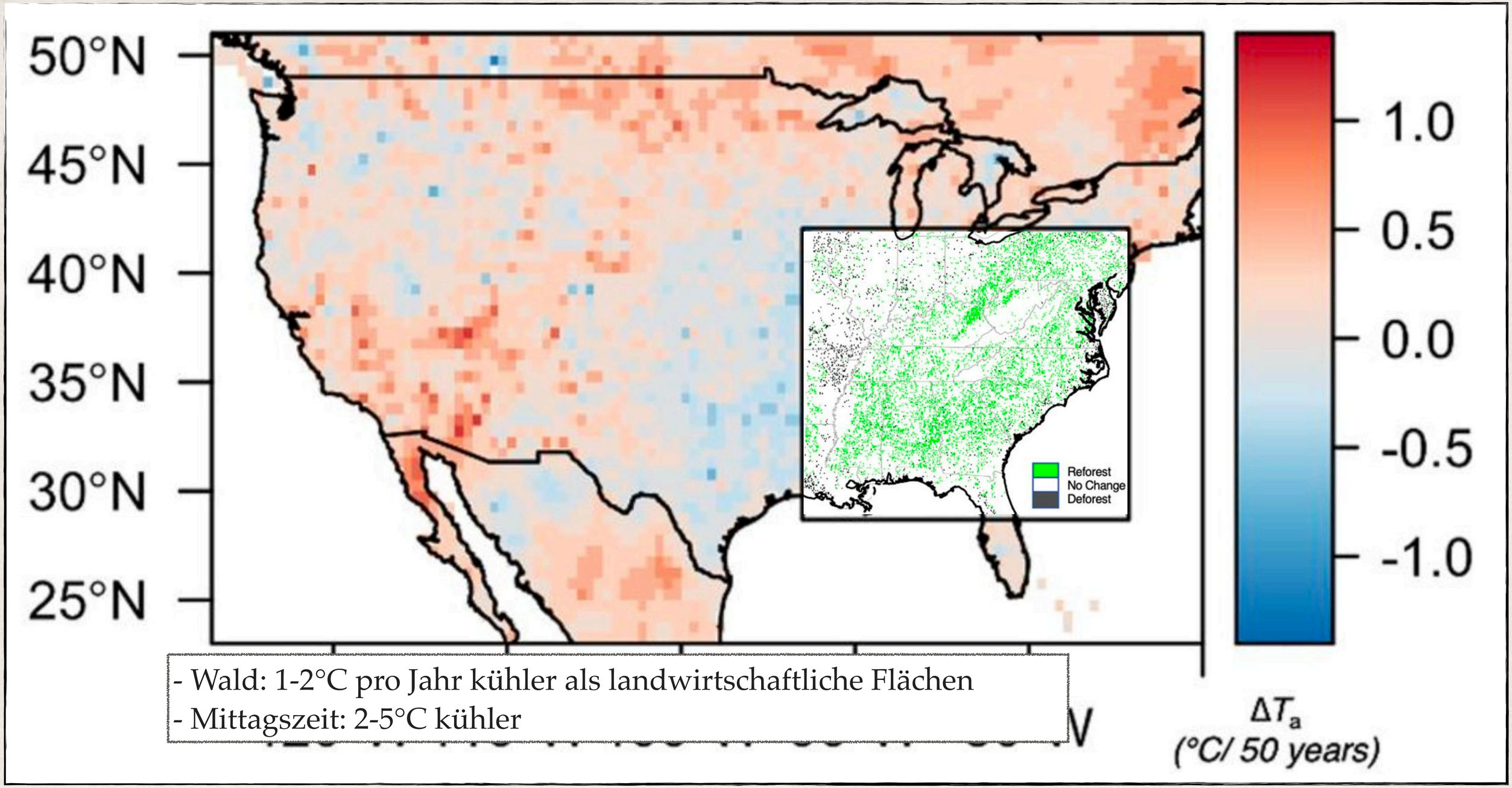

- Wald: 1-2°C pro Jahr kühler als landwirtschaftliche Flächen
- Mittagszeit: 2-5°C kühler

Barnes ML, Zhang Q, Robeson SM, Young L, Burakowski EA, Oishi AChristopher, Stoy PC, Katul G, Novick KA (2024) A Century of Reforestation Reduced Anthropogenic Warming in the Eastern United States

Journal of Environmental Management 366 (2024) 121595

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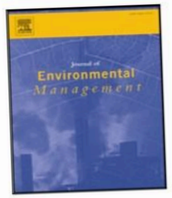

Research article

Assessing the cooling potential of climate change adaptation measures in rural areas

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Measure evaluation

ABSTRACT

Atmospheric heat has become a major public concern in a rapidly warming world. Evapotranspiration, however, provides effective land surface cooling during the vegetation period. Adversely, modern cultural landscapes – due to both water and potential evapotranspiration pathways lacking – are increasingly incapable of offering this important benefit.

We hypothesised that concerted measures for a revived landscape water retention can fuel plant transpiration, especially during dry periods, and thus contribute to climate change adaptation by stabilising the regional climate. Seeking nature-based ways to an improved landscape water retention, we used the land surface temperature (LST) as a proxy for landscape mesoclimate. For our drought-prone rural study area, we identified potential candidate environmental predictors for which we established statistical relationships to LST. We then, from a set of potential climate change adaptation measures, mapped selected items to potential locations of implementation. Building on that, we evaluated a certain measures' probable cooling effect using (i) the fitted model and (ii) the expected expression of predictors before and after a hypothetical measure implementation.

In the modelling, we took into account the spatial and temporal autocorrelation of the LST data and thus achieved realistic parameter estimates. Using the candidate predictor set and the model, we were able to establish a ranking of the effectiveness of climate adaptation measures. However, due to the spatial variability of the predictors, the modelled LST is site-specific. This results in a spatial differentiation of a measure's benefit. Furthermore, seasonal variations occur, such as those caused by plant growth. On average, the afforestation of arable land or urban brownfields, and the rewetting of former wet meadows have the largest cooling capacities of up to 3.5 K. We conclude that heat countermeasures based on fostering both evapotranspiration and landscape water retention, even in rural regions, offer promising adaptation ways to atmospheric warming.

… dass durch gezielte Landnutzungsänderungen eine bedeutsame Kühlung von bis zu **3,5 °C** erreicht werden kann

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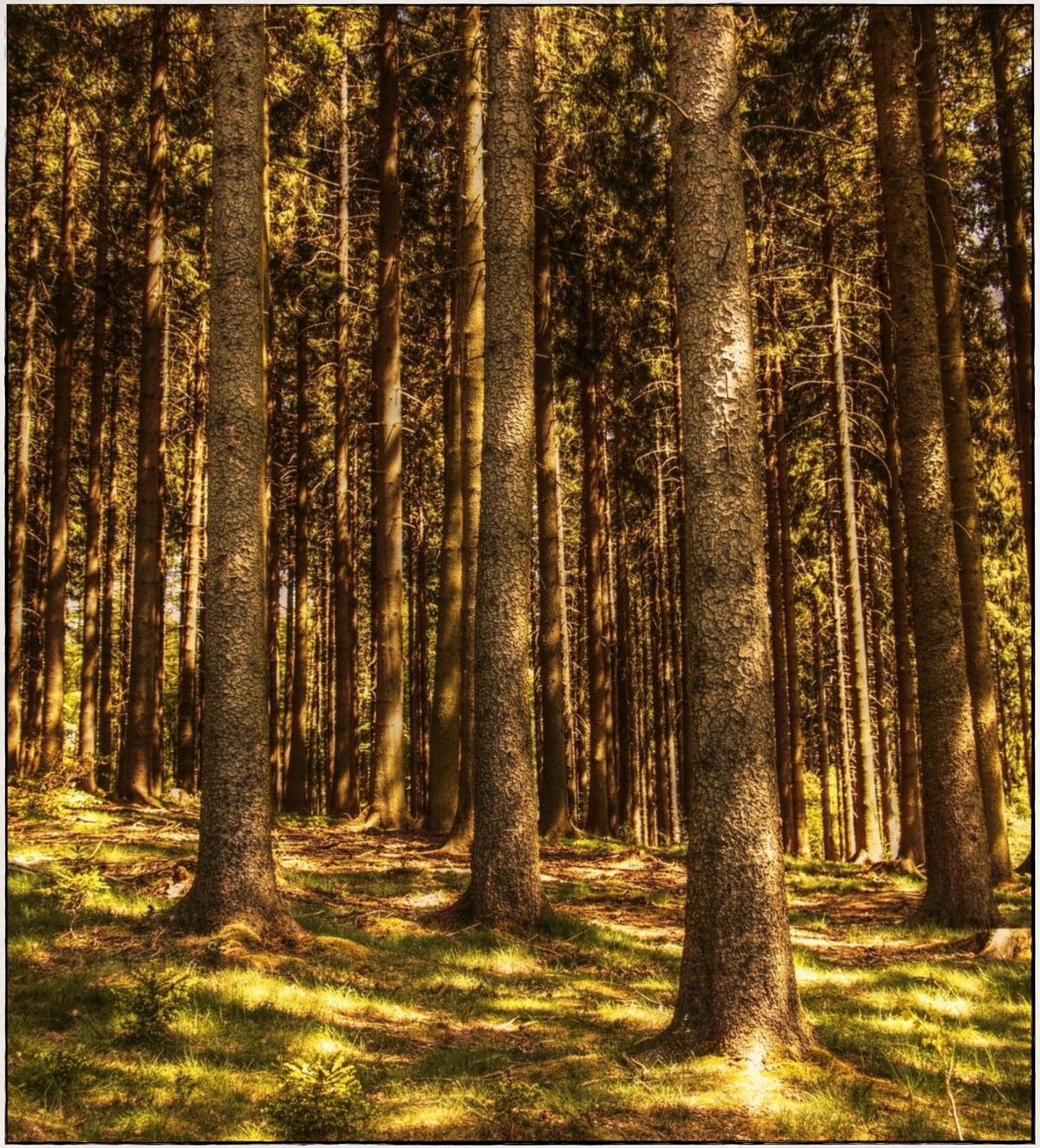
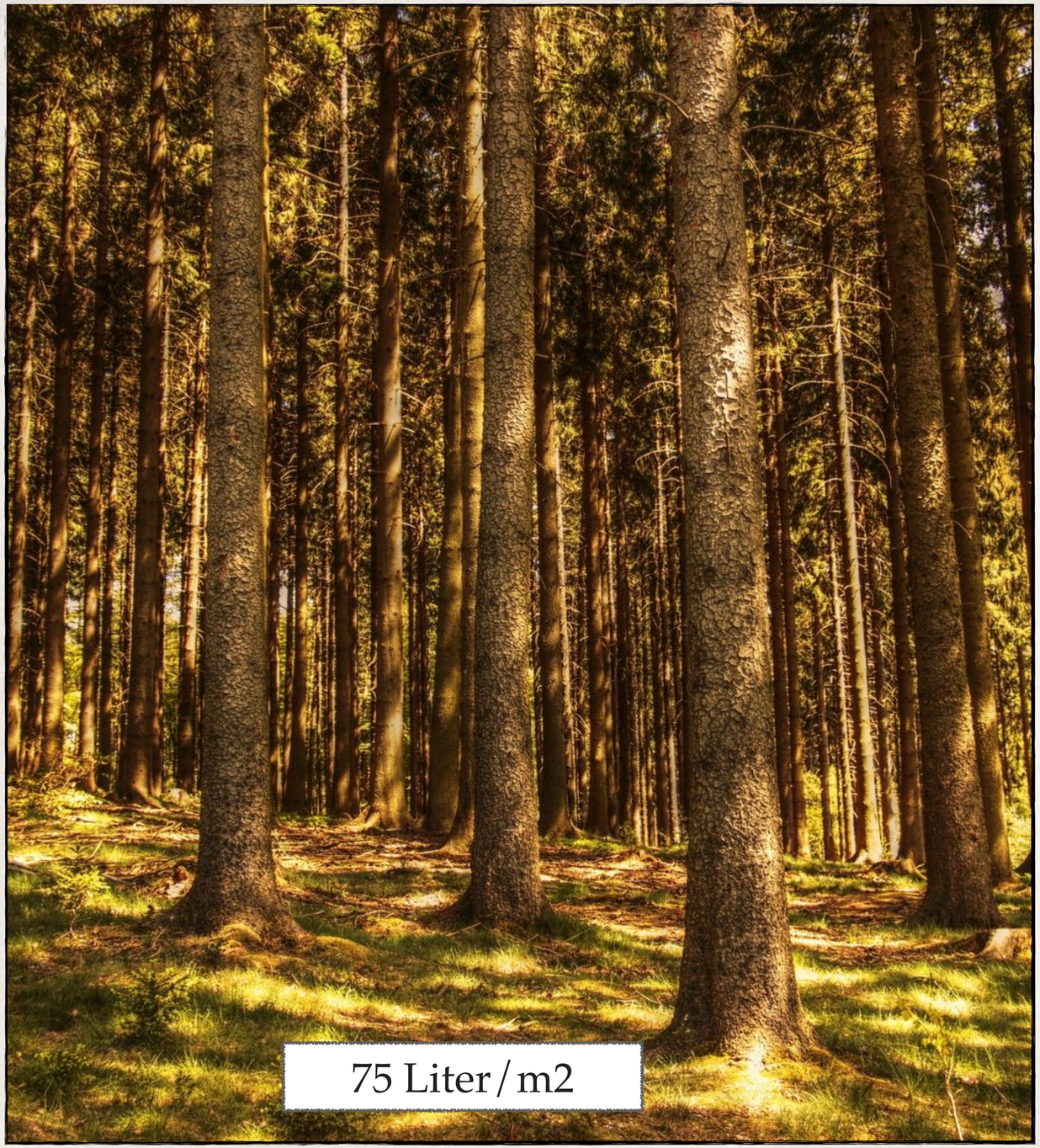
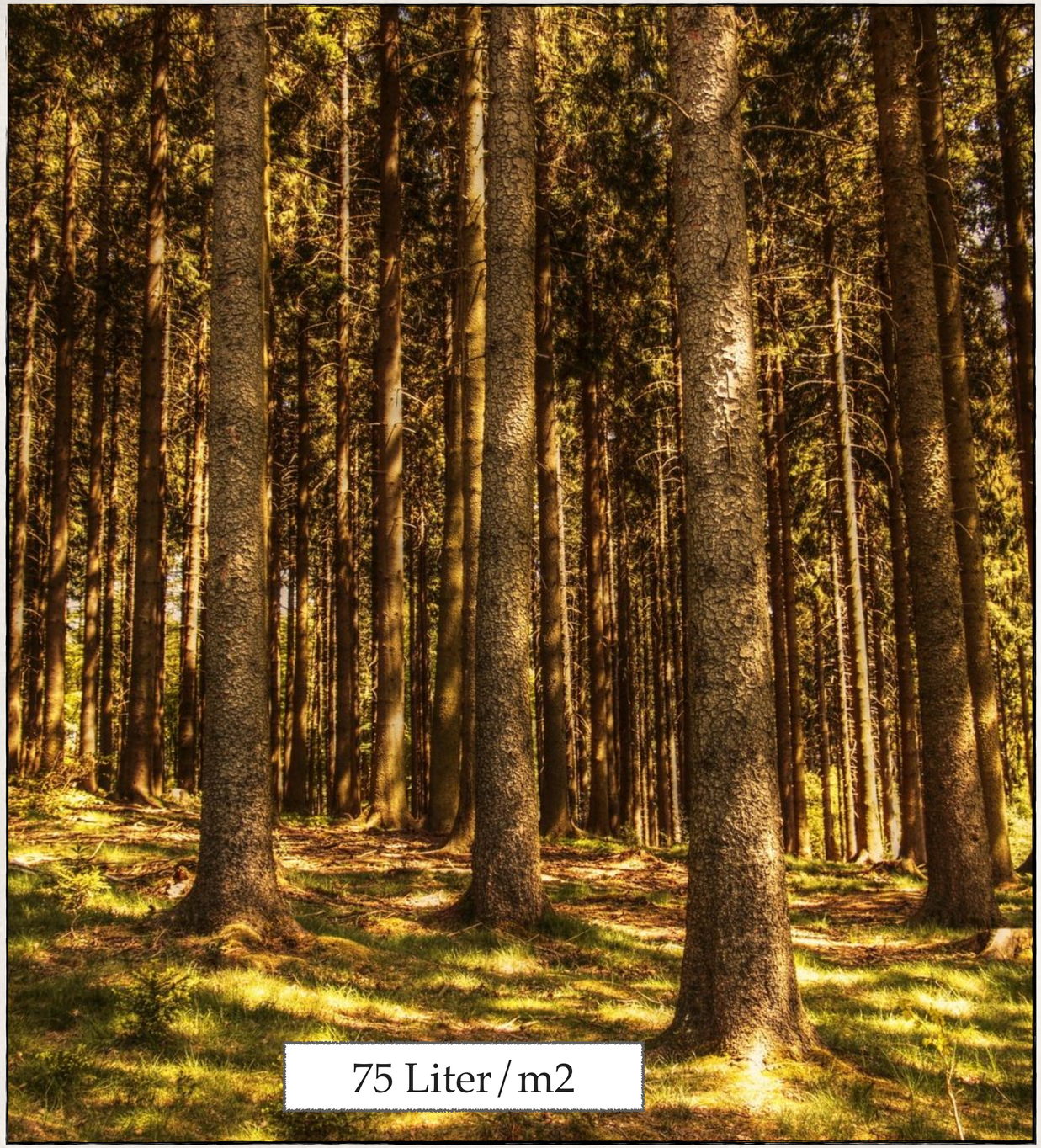


Themenweg Scheuring. Tiefe Böden - Flache Wurzeln - Sauerer Humus. Publikation des EU-Projektes »Interreg Alpine Space«. Ludwig Pertl


75 Liter / m2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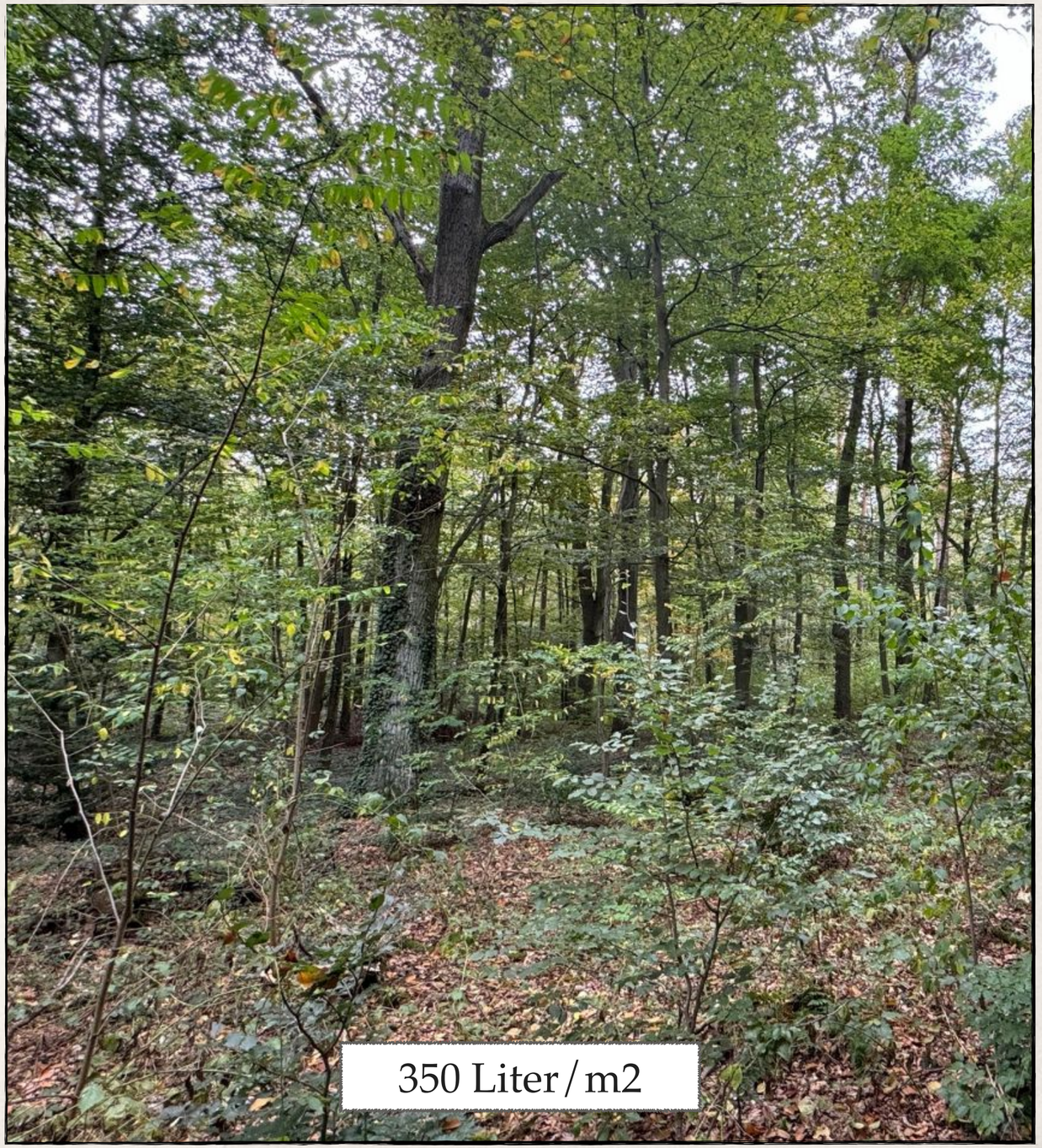
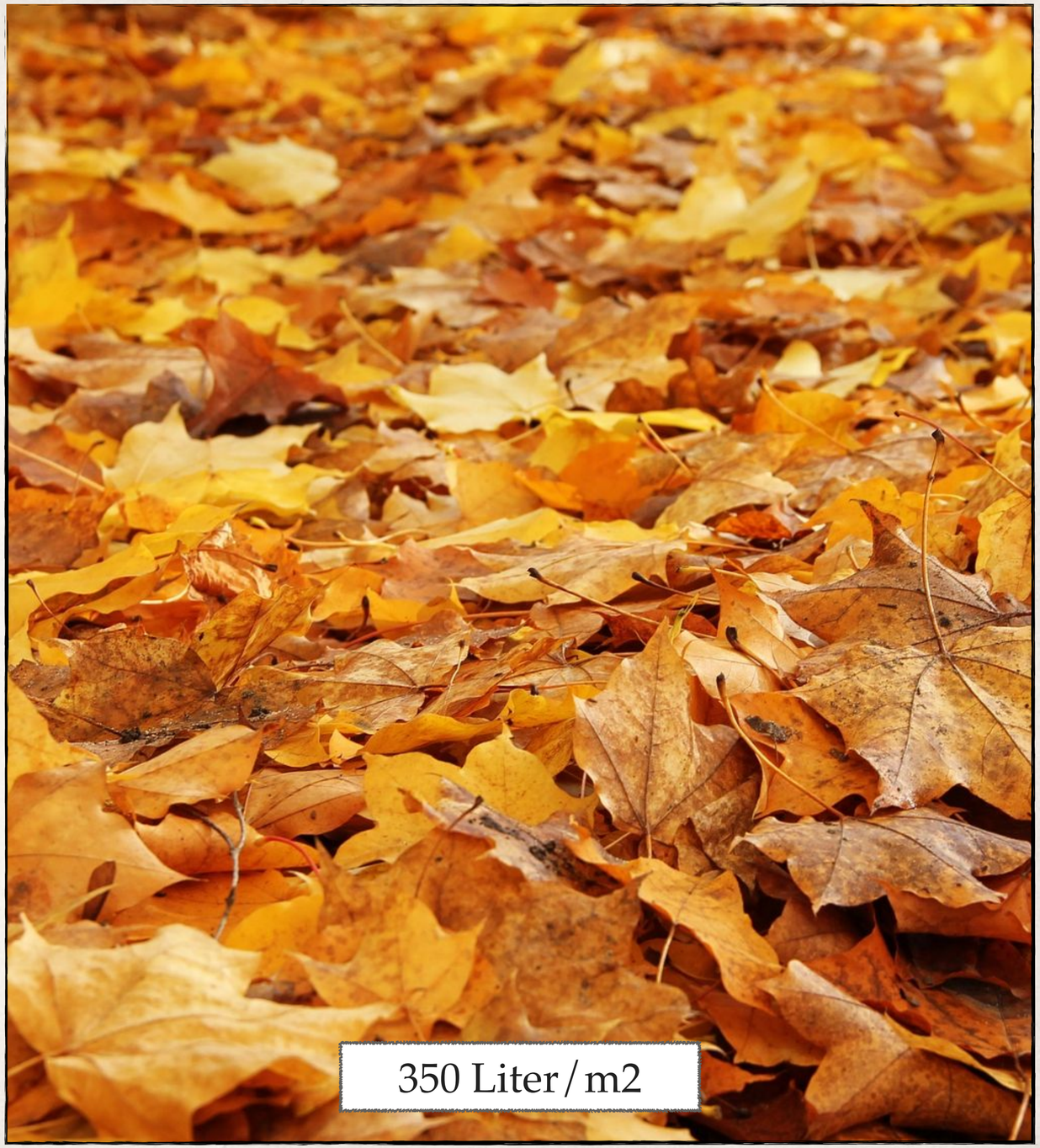
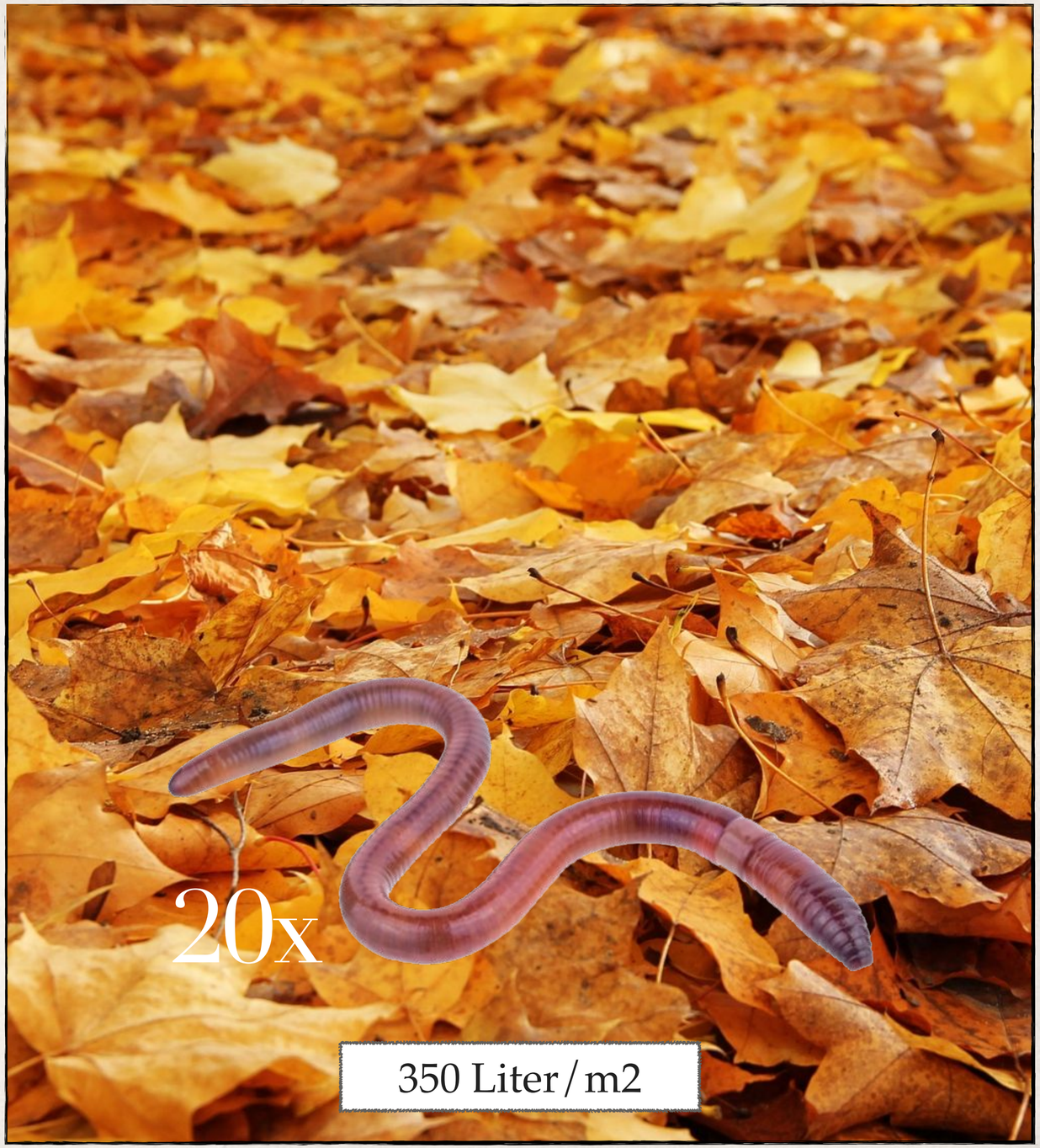

350 Liter / m2


75 Liter / m2

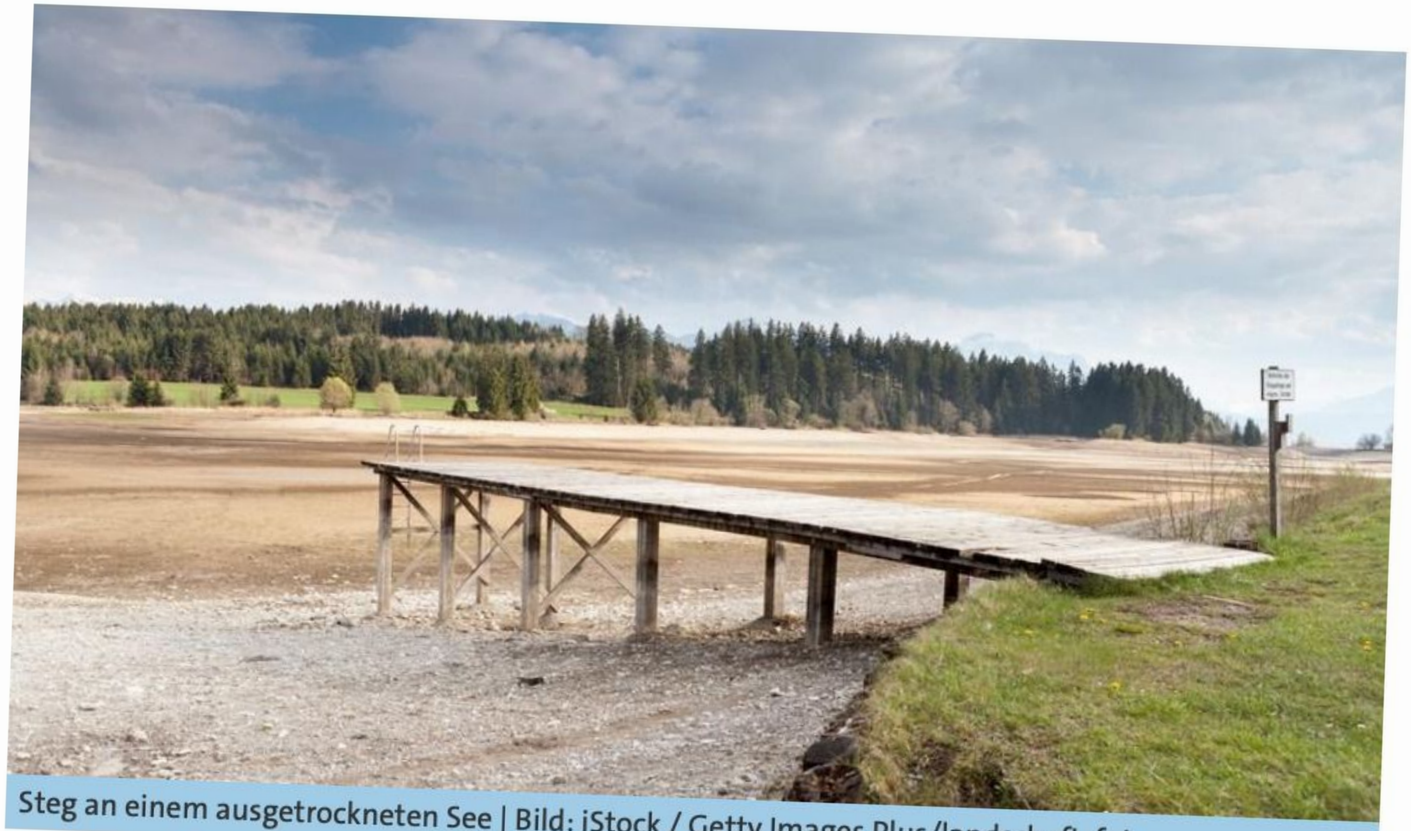

350 Liter / m2


75 Liter / m2


20x
350 Liter / m2

Deutschlands Wasser verschwindet

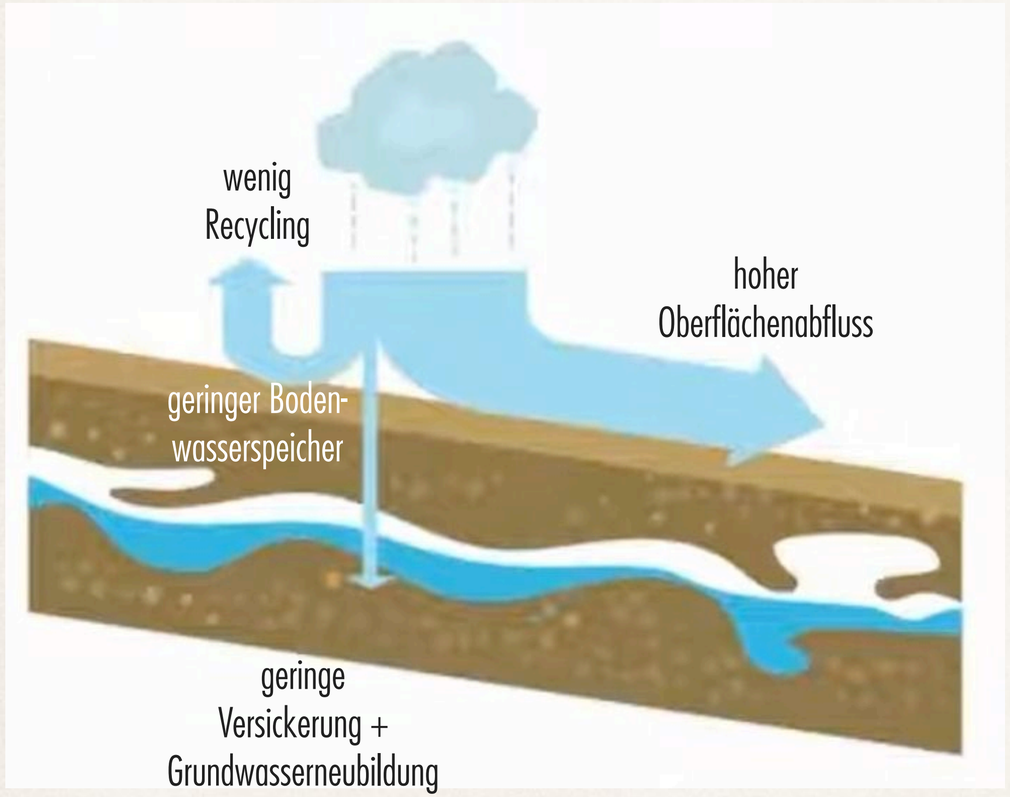
Neue Satellitendaten zeigen dramatische Wasserverluste



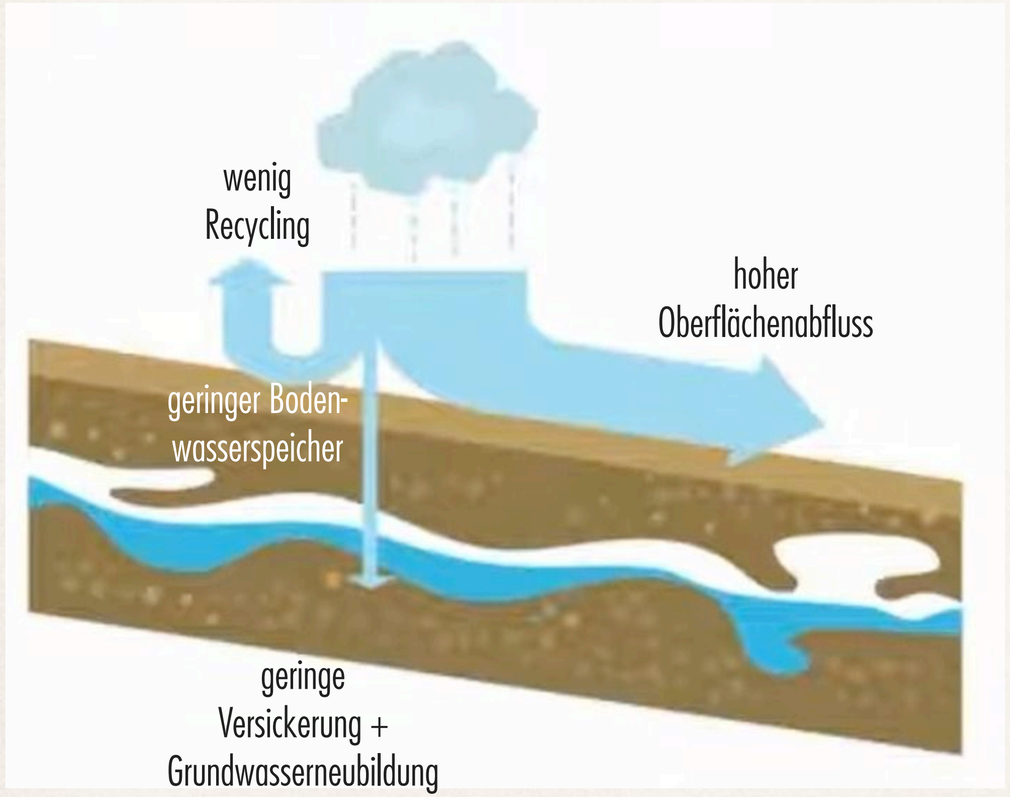
Steg an einem ausgetrockneten See | Bild: iStock / Getty Images Plus/landschaftsfoto

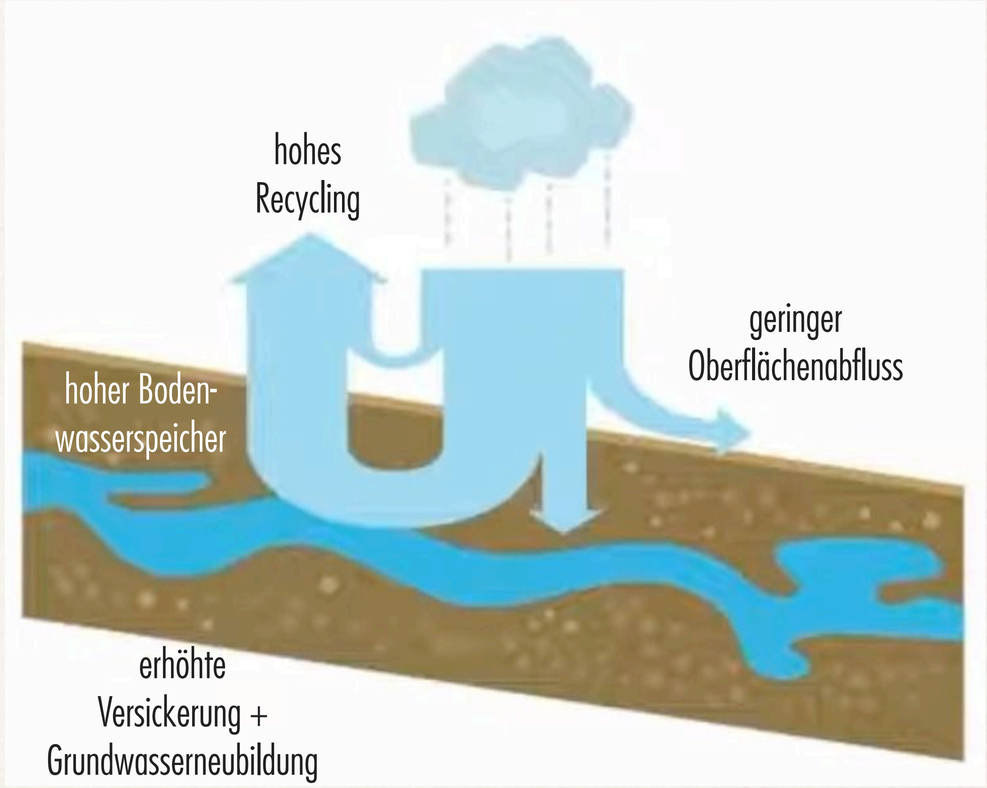
Deutschland hat in den vergangenen 20 Jahren dramatisch an Wasser verloren. Experten schätzen, dass der Verlust der gesamten Wassermenge des Bodensees entspricht. Das zeigen neue Analysen.

Altes vs neues Wasserparadigma

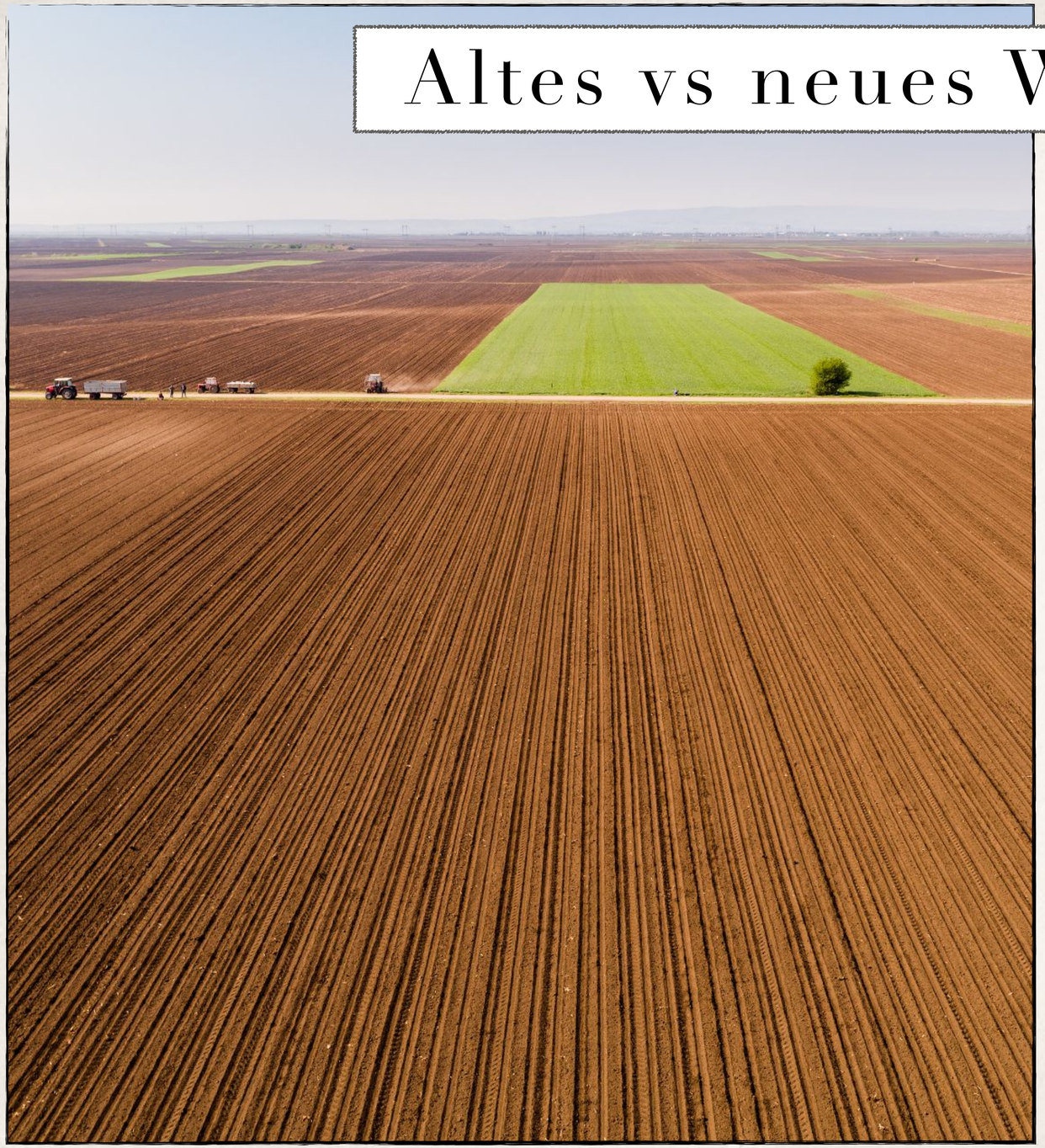


Altes vs neues Wasserparadigma

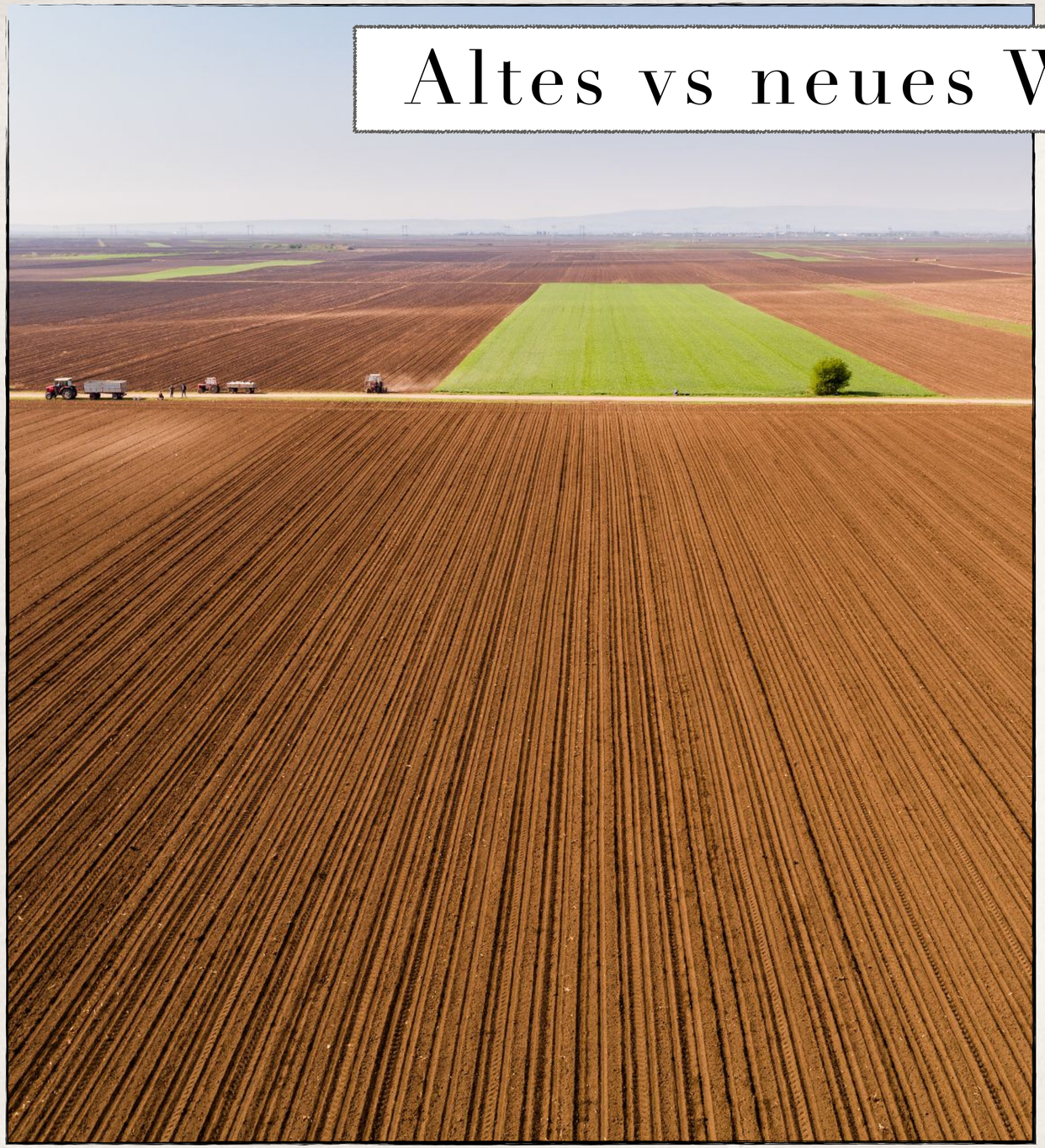




Altes vs neues Wasserparadigma



Altes vs neues Wasserparadigma



Wir müssen mehr Wasser verdunsten,
damit es feucht bleibt.

Humusaufbau

https://www.nrdc.org/bio/lara-bryant/organic-matter-can-improve-your-soils-water-holding-capacity; Libohova, Z. et al.: Reevaluating the Effects of Soil Organic Matter and Other Properties on Available Water-Holding Capacity Using the National Cooperative Soil Survey Characterization Database. Journal of Soil and Water Conservation 73(4), 411–21, 2018, doi: 10.2489/jswc.73.4.411.

Achslast reduzieren

Minimale Bodenbearb.

Direktsaat

Untersaaten

Zwischenfrüchte

Agroforstwirtschaft


Kleegras

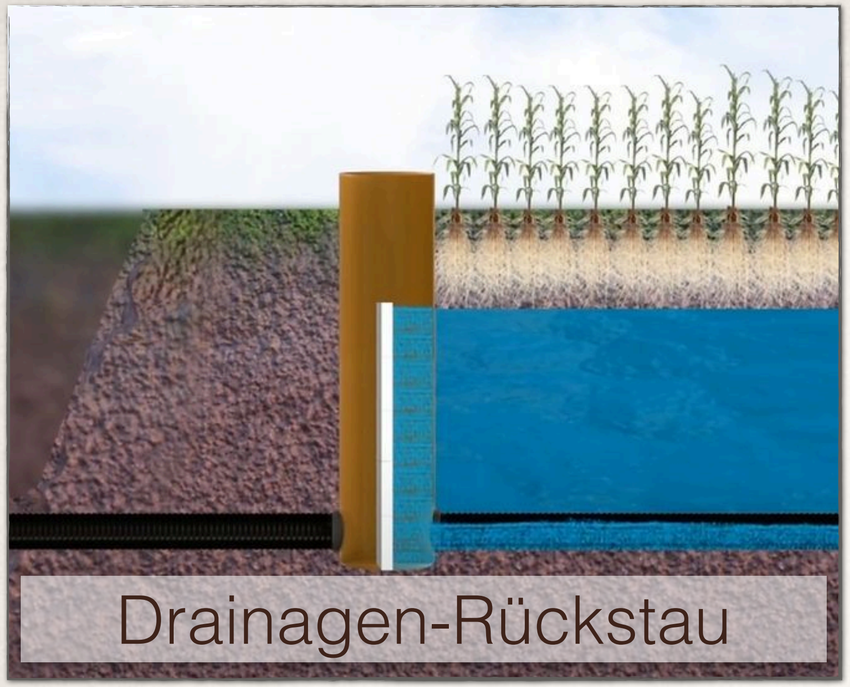

Weite Fruchtfolgen


Keyline Design


Tiere & Ackerbau


Mobgrazing


Waldumbau


Drainagen-Rückstau


Kulturwehre


Biberdämme


Staustufen


Seen


Auen


Gründächer


Schwammstädte


Schwammstädte


Renaturierung


GARIBALDI SOMPLEX
Grüne Gebäude


Grüne Städte

UTE SCHEUB / STEFAN SCHWARZER

Die Humus revolution

Wie wir den Boden heilen, das Klima retten und die Ernährungswende schaffen

Mit Praxistipps zu Humusaufbau und Permakultur

oekom

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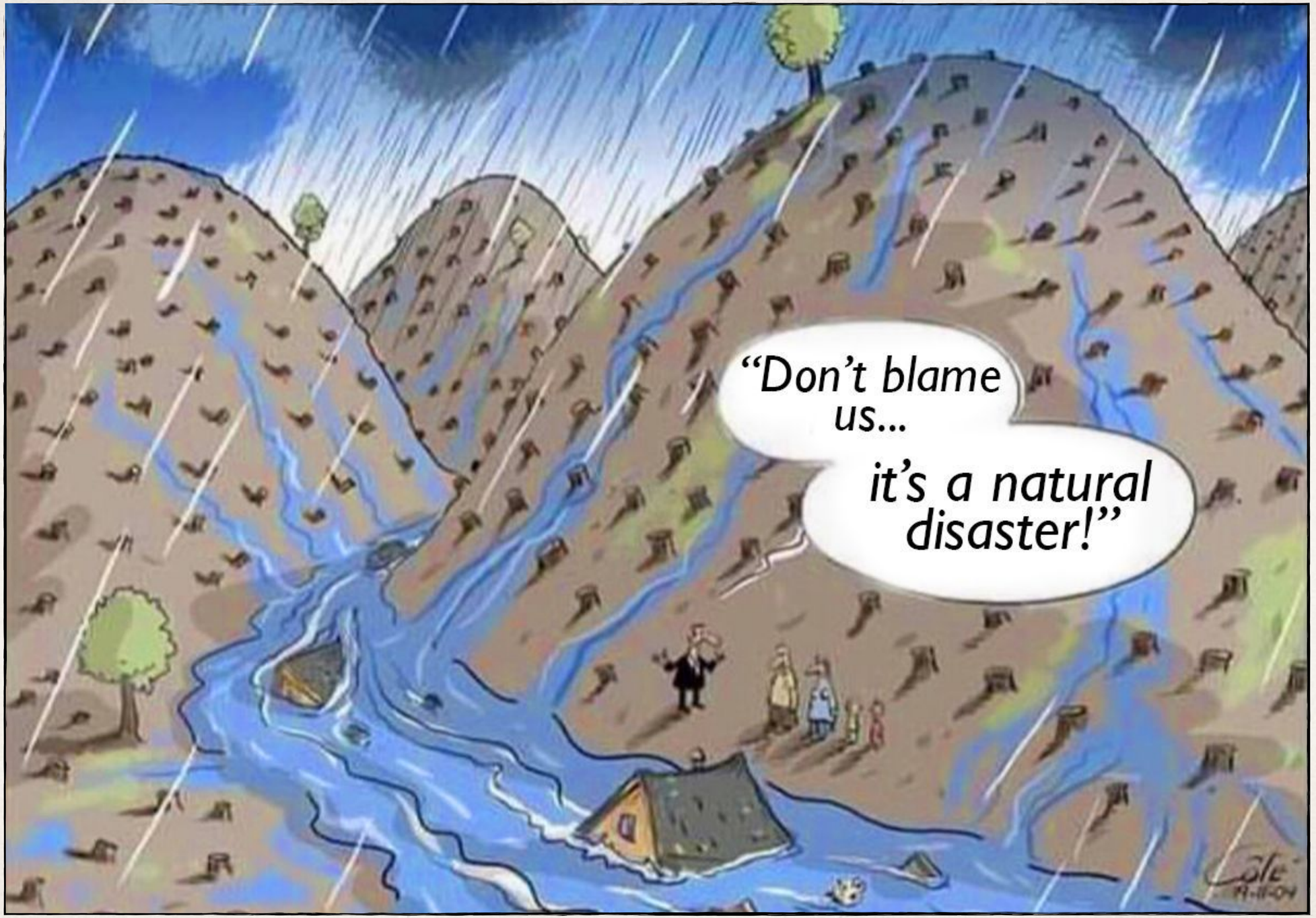
AUFBÄUMEN GEGEN DIE DÜRRE

Wie uns die Natur helfen kann, den Wassernotstand zu beenden

Alles über regenerative Landwirtschaft, Schwammstädte, Klimalandschaften & Co.

oekom


"Don't blame us...
it's a natural disaster!"

Stefan Schwarzer • Aufbauende Landwirtschaft e.V. • www.aufbauende-landwirtschaft.de

Symposium & Webinar-Reihen »Aufbauende Landwirtschaft«, Mikrobiom-Symposium, uam.

Slow it, spread it, store it, sink it

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Slow it, spread it, store it, sink it
Plant it, cover it, keep it

the soil

the water

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