

## SOIL CARBON

### Deep ploughing benefits

*Glob. Change Biol.* <http://doi.org/bjnm> (2016)



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Methods to store organic matter in soils are increasingly being investigated as part of the climate change mitigation arsenal. Conventional studies in arable soils have tended to focus on the regularly ploughed top soil layer.

Viridiana Alcántara from the Thünen Institute of Climate-Smart Agriculture, Germany and co-workers are interested in the potential of subsoils as carbon stores as they have generally low soil organic carbon (SOC) concentrations and thus high storage potential. To address this question Alcántara *et al.* study storage and the stability of SOC in topsoils buried by deep ploughing (55–90 cm), translocating SOC formed near the surface into the subsoil and SOC-poor subsoil material into the ‘new’ topsoil.

Compared with adjacent control plots deep-ploughed soils contained on average  $42 \pm 13\%$  more SOC in the total soil profile 45 years after ploughing. However, the new topsoil was still SOC depleted by 15% suggesting long-term SOC accumulation potential in the topsoil. These findings indicate that deep ploughing can contribute to SOC sequestration by enlarging the available SOC storage space. **AB**

## OCEANOGRAPHY

### Circulation delays warming

*Nature Geosci.* <http://doi.org/bjnp> (2016)

The polar regions are undergoing contrasting changes — the Arctic is warming rapidly, whereas the Southern Ocean has warmed less than the global average. However, in the palaeorecord and model simulations the Southern Hemisphere shows polar amplification, and warming on par with the Arctic, emerging after several centuries. This delay in warming has been attributed to heat storage in deep mixed layers of the ocean, but the deepest of these layers are not located where warming is delayed.

Kyle Armour of the University of Washington, Seattle, USA and co-authors analyse ocean observations and model simulations to show that the Southern Ocean delayed warming is a result of the meridional overturning circulation of the region. The circumpolar wind-driven upwelling of old deep waters counters atmospheric warming around the Antarctic continent, and the equator-ward movement of surface water balances heat uptake of those waters with heat transport north. That is, the ocean currents are delaying the warming of the region.

These results indicate that warming will be delayed in the Southern Ocean until the deep waters, originating in the North Atlantic, are warmed, and this should be taken into account when interpreting warming trends in the region. **BW**

## FISHERIES

### Resilience in diversity

*Proc. Natl Acad. Sci. USA* **113**, 6230–6235 (2016)



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Fish play key functional roles in aquatic ecosystems and provide protein for up to a billion people. Unfortunately mounting pressures on marine ecosystems and biodiversity are undermining these vital functions.

J. Emmett Duffy from the Smithsonian Environmental Research Centre and co-workers use the Reef Life Survey's global database of around 4,500 standardized fish surveys to test the importance of biodiversity to fish production relative to 25 environmental drivers.

They found that temperature, biodiversity and human influence together explain about 47% of the global variation in reef fish biomass. Fish species richness and functional diversity were strong and robust predictors of fish biomass. Interestingly, diversity and climate factors were found to interact, with biomass of diverse communities less affected by rising and variable temperatures than species-poor communities, suggesting that biodiversity can act to buffer global fish biomass from the impacts of climate change. These findings emphasize the importance of marine biodiversity conservation in the face of a changing ocean. **AB**

Written by Alastair Brown, Mat Hope and Bronwyn Wake.

## ADAPTATION POLICY

### Women's roles

*Gend. Technol. Dev.* <http://doi.org/bjnp> (2016)

Many adaptation projects provide technology to rural communities with the aim of easing the impacts of climate change. Little attention is paid to how such projects can reinforce stereotypical gender roles, negatively affecting the communities they are meant to assist, however.

Noémi Gonda from the Central European University, Hungary, investigated the impacts of one such project through participant observation and interviews in Nicaragua's 'Dry Corridor'. She found that the provision of water reservoirs and clean cook stoves did not have the intended impact of 'freeing' women from the burdens of tasks affected by climate change, such as fetching water and fire wood.

In fact, the misperception of these tasks as 'women's jobs' and the construction of women as a homogenous group led to an easing of men's chores in many cases. The projects also failed to acknowledge that climate change can ease women's burdens in some cases — for example, driving women to adapt their cooking habits to use less labour-intensive ingredients derived from crops unaffected by climate change.

The research helps to explain why some projects fail to serve the constituencies they target, and shows the need for more ethnographic research to improve future projects. **MH**