Solar farm sheep graze more

Master's student Emma Kampherbeek's research on the combination of sheep and solar panels, which took her to California, resulted in a publication this month in *Applied Animal Behaviour Science*.

The official name for such dual land use where the production of solar energy is combined with forms of agriculture is agri-voltaics. Emma Kampherbeek studied whether solar panels and sheep make a good combination. The Animal Sciences Master's student, who has now graduated, went to Gold Tree Solar Farm in California, where she studied what she calls 'solar sheep': sheep that graze in solar fields. Using data loggers on their collars, she studied whether and how the sheep use solar fields for grazing. She also looked at the effect that the presence of solar panels had on the quality of the feed in this Mediterranean climate.

The microclimate around the panels boosts the protein content

Heat stress

She found that the sheep grazed more in fields with solar panels than in similar fields without such panels. Kampherbeek explains the increased grazing as partly due to the fact that the solar panels protect the sheep from the heat and extreme weather conditions, which increases time spent grazing. Secondly, the solar panels affect the vegetation: the microclimate around the panels (more shadow, more condensation) leads to a higher protein content and improved digestibility. Of course the climate in the Netherlands is not the same as in California, says Kampherbeek. But parallels can be drawn, especially given climate change. She points out that cases of heat stress and deaths among Dutch livestock have risen substantially in the past ten years. ME

Twan Stoffers with cuvette containing, from the left:common roach, bream, ide, another ide and western tubenose goby. ◆ Photo Twan Stoffers

Good breeding grounds are not enough

Floodplains in the Netherlands have been drastically relandscaped in recent decades in an effort to mitigate the risk of flooding. Theoretically, these interventions created excellent nurseries for fish. And yet the fish populations of the rivers have not increased. Doctoral candidate Twan Stoffers set out to find out what's going on.

He concludes that the breeding grounds are adequate as long as there is sufficient diversity in the environment created by these restoration projects. The young of typical river fish that require running water, such as nase, common dace and ide, thrive in secondary channels of the rivers. These species are four times as likely to be found there as in side arms that only connect with the river at one end.

'Each species has its own optimal habitat, which changes as the fish mature'

By contrast, the biggest populations of fish are found precisely in the side arms where there is very little current. Stoffers: 'It is mainly bream, common roach and perch that thrive there. These are common species that do not require flowing water. Eighty per cent of the young river fish belong to these species.' These common species also occur in the secondary channels, which therefore boast the greatest biodiversity.

Water levels

The results are based on an extensive measuring programme run by Stoffers. The data were added to an investigation commissioned by Rijkwaterstaat on the ecological quality of 46 recovered floodplains. The overall picture shows that there is no such thing as the ideal breeding ground. Stoffers: 'Each species has its own optimal habitat, which changes as the fish mature. The diversity of habitats is essential.' Still, the breeding grounds do not noticeably boost the fish population in the rivers. According to Stoffers, this is due to the connection with the river. 'After the first year in the breeding ground, many of the fish migrate to the river, and that's where things go wrong. Decreasing water levels frequently cause the breeding ground to become disconnected from the river early in the season.' RK