

Su-Eatable Life Project: reducing carbon emissions and water use pressure through sustainable diet

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Abstract. The EU food chain is at present highly carbon and water intensive. A significant contribution to reducing carbon emissions and pressure on water resources resulting from overuse might come from the adoption of a more sustainable and healthier diet. While people are generally aware that the food they eat is an important factor affecting their health, however, the impact that food production and consumption has on the world's resources is less known. There is therefore a need to build methods and tools that create awareness among the population about the potential savings of the resources that sustainable and healthy diets can bring, and stimulate the population to adopt such diets. The EU project SU-EATABLE LIFE aims at i) developing guidelines that define a sustainable and healthy diet, ii) carrying out a wide range of initiatives aimed at increasing awareness and education on food-related issues by citizens/customers and iii) implementing an easy-to-use information system that enables citizens to adopt such a diet. The long-term objective is to contribute to reducing GHG emissions and achieving water savings in the EU via citizen education and active engagement.

1. The global call for sustainable diet

The planet is currently facing dramatic changes at unprecedented rates driven by anthropic activity [1]. Land is consumed and ecosystems altered by urbanisation, agriculture, transportation, waste disposal, industrial settlements, the withdrawal of primary resources and release into the environment of all types of pollutants. We are modifying the climate [2] and impacting natural ecosystems, with a drastic reduction of biodiversity [3].

The increasing level of ecosystem alteration is raising the awareness of governments and citizens. Examples are the Paris Climate Agreement, which for the first time saw global consensus in recognising climate change as a real occurring environmental crisis led by human activities, and has called for action from all the world states; a second example is the growing initiatives around abolishing the use of plastic disposable items to limit the level of pollution and loss of biodiversity in our oceans [4], including the law by the European Parliament, approved in March 2019, banning a wide-range of single-use plastic items by 2021.

The food sector significantly contributes to the alteration of many critical environmental targets, including climate change and GHG emissions, water scarcity and pollution, excess release nutrients like nitrogen and phosphorus into the environment, and the

consequent pollution of water and atmosphere, land use, and biodiversity losses [1, 5]. Food provision is predicted to increase in the coming century with the exponential growth of the world population and food demand, which will grow most steeply for meat as a consequence of the change in dietary habits [6].

Although some of the pressure exerted by the agricultural sector is inevitable, there is growing scientific evidence that an improvement in the key aspects of the food provision sector might leave significant space for reducing the impact on the environment. Such improvement concerns a) changes in dietary habits; b) reductions of food waste, and c) technological improvements for agricultural intensification [5, 7]. At present the most feasible options are the change in dietary habits and the reduction of waste, as they would be mostly driven by the willingness of people, and thus independent from the speed at which technical development in the agro-sector might progress or might be available on a large scale and at reasonable prices to farmers.

The most recent analysis of the world's dietary habits has shown that, particularly in wealthy and developed countries, there is a strong imbalance in the composition of diets towards unhealthy and unsustainable choices [5], with a high consumption of meat, dairy products, processed food high in saturated fats, salt and sugar, and sugar-sweetened beverages. The same authors have

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shown that these types of dietary choices are also those with the biggest environmental impact. A global call for sustainable diets is thus timely and might contribute to keeping most of the critical environmental targets by 2050 within the so-called “planetary boundaries”, or “the global biophysical limits that humanity should operate within to ensure a stable and resilient Earth system” [1,5].

2. SU-EATABLE LIFE

2.1 SU-EATABLE choices to reduce environmental pressures

The SU-EATABLE LIFE project aims to contribute to the international initiatives on sustainable food systems by engaging EU citizens to adopt a sustainable and healthy diet and to achieve a substantial reduction in GHG emissions and water resource use.

The most relevant reviews on sustainable dietary choices have shown that, of the analysed environmental targets, the most significant results obtained with a shift in dietary habits involve the reduction of GHG emissions [5, 7, 8]. The biggest change in dietary composition would involve a drastic reduction in animal derived proteins, in particular from ruminant animals, and a substantial increase in plant-based products, including legumes, nuts and plant-based oils as protein and fat sources [5]. Most recent literature estimates [5] have shown that such a shift might substantially reduce the GHG emissions from agriculture by 2050, compared to the GHG baseline emission in 2010. This might be much more effective than changes in food production practices and halving food loss and waste.

A more balanced consumption of meat might also bring significant benefits for the use of water [9]. This is particularly true for beef meat which has a water footprint significantly higher than most protein sources, while on the lower end of the scale of impact on water resources we find the proteins of legumes and many fishes [10].

Targeting the reduction of GHG emissions and water savings, based on published values of carbon footprints and the water footprints of dietary products [5, 7, 9-11], we have calculated that a shift from a daily to a bi-weekly consumption of meat, in particular of bovine origin, could save the equivalent of up to 535 Mt of CO₂ per year and 200 billion cubic meters of water per year, if applied to the whole EU population.

The operative target of the SU-EATABLE LIFE project is to reach around 50.000 persons and actively engage around 5000 people in three years to evaluate the potential reduction of GHG emissions and water saving which can be obtained by informing and engaging citizens on sustainable diets.

2.2 SU-EATABLE approach

Making the environment a priority starts at the individual level [12]. The behavioural choices that people make daily play indeed a fundamental role in enhancing

sustainability at the global level. SU-EATABLE project focuses on a set of experiments to raise the awareness and knowledge of citizens on the issues of sustainable diets; dietary choices that are good for human health and the environment; food choices and climate change; food choices and environmental impacts.

The project involves the main actors for massive citizens engagement, i.e. caterings and canteens at university and work places in Italy and the UK, including around 56,000 people overall. The target is the active involvement of at least 5000 people for a continuous engagement leading to a consolidated change in dietary habits towards healthier and more sustainable options. Lesson learnt from a first round of engagement experiments constitute the basis for a transferability strategy to other players like food retailers and municipalities, as well as other canteens.

The Sustainable Restaurant Association [13] in UK and the Barilla Centre for Food & Nutrition Foundation (BCFN) [14] coordinate the experiments in the two countries. The GreenApes benefit corporation [15] will provide a social engagement platform to engage consumers in the experiments. The platform allows to test different challenges and approach clients with gamification. The University of Wageningen and the BCFN will evaluate the most effective actions in terms of social and environmental impacts along the experimentation phase. The final output will be to define the best practices for citizen engagement on the issue of sustainable diets to firstly meet the environmental targets of the project, and secondly to provide guidelines for replication in order to contribute to meet the European targets of GHG reduction in accordance to the Paris Agreement and to reduce pressure on EU water resources.

2.3 SU-EATABLE basic principles for action

The SU-EATABLE LIFE actions are based on a set of basic principles which respond to the following criteria:

- Dietary choices should be based on a balanced and healthy diet standard, as defined by world leading experts including the World Health Organisation [16], the Joint WHO/FAO Expert Consultation on diet, nutrition and the prevention of chronic diseases (Geneva 2002), the British Dietetic Association (BDA). For example, healthy diets are generally considered to include a diversity of nutrient-rich foods, such as vegetables, fruits, whole grains, pulses (beans, legumes, nuts and seeds), unsaturated vegetable oils, with (for non-vegetarians or non-vegans) modest amounts of meat, fish, eggs and dairy [5, 17].
- The dietary choices should bring clear and recognised benefits to the environment, and in particular to GHG emission reduction and water footprint reduction, for example, reducing the weekly consumption of bovine and ovine meat and dairy products like cheese, while increasing plant-based food choices [5, 7, 9-11].

- The dietary options in canteens and in everyday life should also look at additional actions which might have a minor, although still recognised impact on the targeted environmental issues, but might be highly relevant for linked environmental issues. Examples include a preference for fresh food, reduction of food waste, avoiding the use of bottled water and single use plastics.

Agriculture and Food Systems for Nutrition, London (2016).

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References

1. J. Rockstrom, et al., *Ecol Soc*, **14**, 32 (2009).
2. IPCC, 2018: Summary for Policymakers. In: Global warming of 1.5°C. (V. Masson-Delmotte, et al eds). World Meteorological Organization, Geneva, Switzerland, 32 pp (2018).
3. FAO 2019, *The State of the World's Biodiversity for Food and Agriculture*, J. Bélanger & D. Pilling (eds.). FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp. (2019).
4. J. R. Jambeck, R. Geyer, C. Wilcox, T.R. Siegler, R. Perryman, A. Andrady, R. Narayan and K.L. Law. *Science*, **347**, 768-771 (2015).
5. W. Willet, et al. *Lancet*, **393**, 447-492. (2019).
6. L. Lassaletta, G. Billen, J. Garnier J et al. *Environ Res Lett* 11 0950072016 (2016).
7. J. Poore J. and T. Nemecek. *Science*, **360**, 987-992 (2018).
8. T. Garnett. *Changing What We Eat: A Call for Research and Action on Widespread Adoption of Sustainable Healthy Eating*, Food Climate Research Network (2014).
9. D. Vanham. *Water Internat.* **43**, 731-745 (2018).
10. M.M. Mekonnen and A.Y. Hoekstra. *The green, blue and grey water footprint of farm animals and animal products. Value of Water Research Report Series No. 48*, UNESCO-IHE, Delft, the Netherlands (2010).
11. S. Clune, E. Crossin, K. Verghese. *J. Cleaner Prod.* **140**, 766-783 (2017).
12. OECD. *Greening household behaviour: Overview from the 2011 survey*, OECD studies on environmental policy and household behaviour. OECD Publishing (2013).
13. The Sustainable Restaurant Association website [Online]. Available: <http://www.thesra.org> [Access date: 28th April 2019].
14. The Barilla Centre for Food & Nutrition Foundation website [Online]. Available: <http://www.barillacfn.com> [Access date: 28th April 2019].
15. The GreenApes benefit corporation website [Online]. Available: <http://www.greeapes.com> [Access date: 28th April 2019].
16. WHO, FACT SHEET N°394, Healthy diet, 2018.
17. GLOPAN, *Food systems and diets: Facing the challenges of the 21st century*. Global Panel on