

## Hands-on sustainability: How can we contribute to the construction of a sustainable future?

Amparo Vilches\*, Benito Vázquez Dorrió\*\*, Daniel Gil Pérez\*

\**Departament de Didàctica de les Ciències Experimentals i Socials, Universitat de València*  
*amparo.vilches@uv.es, daniel.gil@uv.es*

\*\**Dpto. Física Aplicada. Universidade de Vigo*  
*bvazquez@uvigo.es*

**Abstract.** *The scant response of citizens to reiterated calls for attention to the serious problems affecting all humanity leads to a belief that there are serious obstacles that must be studied in order to understand how to overcome them. In this work we will focus on one of the more important of these problems – the widespread yet incorrect perception that the action of the individual is of little importance – and we will attempt to show from an eminently practical viewpoint the relevance, for the construction of a sustainable future, of what each one of us does or does not do, in general – as a consumer, professional and citizen – and in particular – in the sphere of education.*

**Keywords.** Planetary emergency, Environmental Education for a sustainable future, Hands-on Science.

### 1. Introduction

Until the second half of the 20<sup>th</sup> century, our planet seemed huge, practically limitless, and the effects of human activity remained locally compartmentalised. These compartments, however, have begun to fade over recent decades and many problems have taken on a global character that has made “the world situation” a direct cause for concern. News on climate change, environmental deterioration, excessive, unchecked consumption of energy and raw materials with the subsequent exhaustion of resources and, in short, the serious situation of planetary emergency in which we are immersed [1-3], have all jumped to the front pages and opinion sections of the media. Calls by the international scientific community, NGOs and the UN itself, are multiplying. At the same time, there are over twenty international agreements on environmental protection linked to the same number again of protocols putting them into

practice [4-5]. And yet most citizens, including policy makers and educators, continue not to react in the face of serious threats of social collapse [6] and even the extinction of our species [7], which is in principle in contradiction to existing positive social interest, as seen in innumerable information resources regarding necessary respect for the environment [8-11].

It can be concluded, therefore, that there are serious obstacles which hinder necessary changes in attitude and behaviour and impede even a determined involvement of educators at all levels of formation for citizens who are aware of the situation of planetary emergency and its causes, and prepared to adopt the necessary measures to face up to the situation [12].

It is necessary, then, to keep up efforts to bring these obstacles to light and study how to overcome them. In this article we focus on one that most directly hinders finding a positive answer to the key question “How can each one of us contribute to building a sustainable future?” This is a reference to the widespread perception that individual actions are irrelevant. We will critically analyse this misconception and put forward some proposals for action to overcome it.

### 2. Are individual actions irrelevant?

Participants in courses and workshops on education for sustainability often express doubt about the effectiveness of individual actions, small changes in our habits or our lifestyles, that education can foster: The problems of exhausted energy resources and pollution – they usually state, for instance – are due, fundamentally, to big industry; what each one of us can do regarding this is, comparatively, insignificant.

Quite simple calculations that participants themselves can make with regard to everyday situations (figure 1) show, however, that

individual commitment has a global repercussion. For example, although small reductions in energy consumption mean a small per capita saving, when this is multiplied by millions of people it can mean huge amounts of energy, with the subsequent reduction in pollution.

These calculations and estimations can be reinforced with hands-on activities [13-14] such as, for example, determining how much water is lost from a badly turned off dripping tap.

It should be stressed, therefore, that not only is it not true that our small actions are insignificant and irrelevant, but also that we are dealing with necessary, indispensable measures if we want to contribute in progressing towards a sustainable future and increased involvement of citizens.

For the future is going to depend to a great extent upon the model of living we follow and, although attempts are made to impose this on us, the capacity we all have to change it should not be underestimated [11]. Agenda 21, fruit of the first Earth Summit, already indicated that participation by civil society is a vital element in the advance towards sustainability.

A systematic effort is therefore necessary to incorporate education for sustainability as a key objective in the formation of future citizens, and make the need understood for actions that contribute to a sustainable future in several spheres: responsible consumption, professional activity and action by citizens.

A careful follow up of these actions is also needed. Continued educational activities are therefore required that transform our conceptions, our habits, our perspectives... and that guide us in the actions to be taken.

But its not enough to understand the importance of our actions and have a general view of the fields of action: we need to move into action. In the same way that scientific education calls for hands-on experiments, education for sustainability demands involvement in specific actions that need to be defined and transformed into a commitment to act.

### 3. Specific proposals

In different workshops imparted to secondary and university students and trainee and working teachers, we have been able to ascertain that collective work in small groups, followed by group sharing, gives rise to numerous proposals for concrete action that can become the basis for real commitment that can be (self) evaluated for the building of a sustainable future.

14 trees, which take 14 years to grow, are needed to produce 1 tonne of paper



1 litre of oil contaminates 1 million litres of water



In 1 hour a car consumes the same oxygen as 800 people in one day



The solar energy received by Earth each year is 20 times that stored in all the world's fossil fuels



To create 100kca of meat, 6000kca of edible vegetable material are needed



10 drops of water a minute means an annual waste of 2000 litres



Figure 1. The importance of individual actions

Together with the classic “3Rs” (*reduce, reuse and recycle*), that correspond to us as consumers and that can give rise to numerous specific proposals of interest, another three guideline principles arise that also respond to our roles as professionals and citizens:

- *Use technologies that respect the environment and people*
- *Contribute to the education of citizens* (we are all educators as we interact with each other)
- *Participate in socio-political actions* for sustainability

And it is equally understood that there is a need for continual evaluation of the effects of our actions that introduces, if needs be, *corrective offsets*.

They are proposals that occur again and again in the workshops, as the fruit of collective work, and they turn out to coincide essentially with what is collected in wide-ranging literature [18-22]. Below (Boxes C1 to C7) we outline the most frequently formulated specific proposals:

#### **C1. Reduce (Do no waste resources) [26-30]**

##### ***Reduce water consumption, for hygiene, watering, swimming pools...***

Short showers

Turn off taps (whilst cleaning teeth, putting on soap, etc.)

Drip feed watering

##### ***Reduce energy use for lighting***

Use energy saving light bulbs

Switch off unnecessary lights (beat inertia)

Make the most of natural light

##### ***Reduce energy consumption in heating and cooling***

Insulate housing adequately

Do not program very high temperatures (wear warmer clothing) or very low temperatures (ventilate better, use canopies...)

Switch off unnecessary radiators or air conditioners.

##### ***Reduce energy consumption in transport***

Use public transport

Use a bicycle and/or go on foot

Organize shared transport

Reduce speed, drive efficiently

Avoid plane travel whenever possible

Avoid lifts whenever possible

##### ***Reduce energy consumption in other household appliances***

Load washing machines, dishwashers, etc. appropriately

Turn off the TV, PC, etc completely when not in use

Defrost the freezer, check boilers and heaters, etc.

##### ***Reduce energy consumption in food, improving it at the same time***

Eat more vegetables, pulses and fruit, and less meat

Respect closed seasons and do not eat small, young fish

Avoid exotic products that demand high cost transport

Eat products in season and produced organically

##### ***Reduce paper use***

Avoid printing documents that can be read on screen

Write, photocopy and print on both sides of the paper

Do not leave excessive margins

##### ***Combat Consumerism***

Analyze advertising critically

Mute commercials

Do not be pulled in by commercial campaigns around St Valentines, Festive season, etc.

Program purchases with a needs list

#### **C2. Reuse [23-24]**

##### ***Print on the other side of already used paper***

##### ***Collect sink and shower water for the WC***

##### ***Also collect rain water for watering or WC***

##### ***Do not use disposable objects***

In particular, avoid plastic bags and wrappers, aluminium foil, paper cups, etc.

Substitute them with reusable ones, repair these when necessary for as long as possible

##### ***Use recycled and recyclable products (paper, toner, etc)***

##### ***Encourage the reuse of computers, toys, clothes, etc.***

Donate to charities that manage this

##### ***Rehabilitate housing***

To make it more sustainable (better insulation, etc.) and avoid new construction

#### **C3. Recycle [9,26,31]**

##### ***Separate waste for selective collection***

##### ***Take what cannot be left in the usual bin to "civil amenity sites":***

Batteries, mobile phones, computers, oil, toxic chemicals, etc.

##### ***Do not pour waste down WCs or drains***

**C4. Avoid products that do not respect the environment and people [9,26,32]**

***Personally apply the precaution principal***

Do not buy products without finding out how harmful they are: check the ingredients of foodstuffs, cleaning materials, clothes, etc., and avoid those that do not offer guarantees  
Avoid sprays and aerosols (use hand sprays)  
Apply safety norms at work, at home, etc.

***Opt for renewable energies at home, in the car, etc.***

***Use efficient, low energy, low contamination (A++) household appliances***

***Reduce battery consumption and use rechargeable ones***

**C5. Contribute to civil education and action [33-38]**

***Get well informed and discuss the situation with others*** (family members, friends, co-workers, students, etc.) ***and, above all, what we can do***

***Carry out dissemination and encouragement tasks:***

Use the press, Internet, video, ecology fairs, schools materials, etc.

Help raise awareness of sustainability problems and those closely linked to consumerism, population growth, environmental decline, imbalance, etc.

Inform about actions we can take and encourage them to be put into practice, promoting campaigns such as the use of energy saving light bulbs, reforestation, responsible parenthood, forming associations, political work, etc.

***Aid in conceiving measures for sustainability as an opportunity that guarantees the future of everyone and not as a limitation***

Encourage social recognition of positive measures

***Study and apply what one can do for sustainability as a professional***

Research, innovate, teach...

***Contribute to promoting the environment at work, in the neighborhood and city where we live, etc.***

**C6. Participate in socio-political actions for sustainability [1, 19, 39]**

***Respect and help others respect legislation that protects the environment and biodiversity***

Avoid adding to noise, light or visual pollution  
Do not smoke where this might damage others, and never throw cigarette butts to the ground

Do not leave rubbish in the woods, on the beach, etc.

Avoid moving to housing that contributes to the destruction of ecosystems

Take care not to damage wildlife

Comply with traffic norms for the protection of people and the environment

***Denounce continued growth policies that are incompatible with sustainability***

***Report ecological crimes:***

Illegal tree felling, forest fires, waste dumping, predatory development planning, etc.

***Respect and help respect Human Rights***

Report any discrimination based on ethnic, social gender or other reasons

***Collaborate actively and/or economically with associations that defend sustainability:***

Aid programs for the Third World, environmental defense, aid to people in difficulty, human rights promotion, etc.

***Call for the application of the 0.7 aid for the Third World and contribute personally to this***

***Promote Fair Trade:***

Reject products produced through predatory practices (such as tropical timber, animal pelts, over fishing, predatory tourism, etc.) or that are obtained using a workforce without labour rights, child labour

Support fair trade enterprises

***Demand clear informative policies on all the problems***

***Defend the right for research without ideological censure***

***Demand the application of the precaution principle***

***Oppose unilateralism, wars and political predators:***

Demand respect for international law

***Promote democracy in world institutions*** (IMF, WTO, World Bank, etc.)

***Respect and defend cultural diversity***

Respect and defend language diversity

Respect and defend lore, customs and traditions (that do not contravene human rights)

***Vote for parties with more favorable policies on sustainability***

***Work so that governments and political parties take on the defense of sustainability***

***Demand local, state and universal legislation for environmental protection***

***“Cyberactivism”:* Support solidarity and sustainability campaigns from the computer**

**C7. Evaluate and offset [40-41]**

**Carry out personal behavior audits**

At home, with transport, civil and professional action, etc.

**Offset the negative repercussions of our acts** (CO<sub>2</sub> emissions, use of contaminating products, etc.) **through positive actions**

Contribute to reforestation, help NGOs, etc.

**4. The educational role of action**

It is essential, without doubt, *to understand* the relevance our actions have – what we do or do not do – and construct a global view of the measures in which we can become involved. But educative action cannot be limited to achieving this understanding, taking for granted that this will lead to effective shifts in behaviour: a fundamental obstacle in obtaining the involvement of citizens in building a sustainable future is the reduction of educative action to conceptual study

It is necessary, therefore, *to establish action commitments* in education centres, workplaces, neighbourhoods and in households themselves, in order to *put into practice* some of the measures [42] and carry out follow up of the results obtained. These actions, *properly evaluated*, become the best procedure for profound understanding of the challenges, and the impulse for new commitments.

With this aim it is helpful to transform the specific proposals given above into a follow up or (self) evaluation network, starting with the acquisition of concrete commitments that can be evaluated periodically, such as can be seen in Figure 2.

POSSIBLE ACTIONS		Are you doing it?	Are you going to do it?
<b>REDUCE</b>			
<b>Reduce water consumption, for hygiene, watering, ...</b>			
Short showers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Turn off taps (whilst cleaning teeth, putting on soap, etc.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Drip feed watering	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Reduce energy use for lighting</b>			
Use energy saving light bulbs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Switch off unnecessary lights (beat inertia)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Make the most of natural light	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

**Figure 2. Network of concrete and (self) evaluation commitments**

But before implementing this task in our courses and workshops, *it is necessary to create our own network of commitments that can be evaluated*, both in the realm of consumers and citizens (which allows us to aim better at those we work with, thanks to knowledge gained through our own experience), and with regards to our professional realm: In what way are we contributing, *as educators and researchers*, to the Decade of Education for Sustainable Development? What is our response to the call from the United Nations aimed at educators from all areas and levels for us to contribute to the formation of citizens prepared to contribute to the building of a sustainable future?

**5. Conclusions**

We end by remembering that we are at the start of a Decade that will be decisive for the future of humanity in one sense or another: sadly decisive if we cling to our inertia and do not become aware of the need to reverse a process of decay that constantly sends us unmistakable signs in the form of global warming, anti-natural catastrophes, loss of biological and cultural diversity, millions dying through starvation and war – the suicidal fruit of short term interests and fundamentalisms, of dramatic migrations, etc. Fortunately decisive if we are able to create a universal movement in favour of a sustainable future *that has to start today*. That is the objective that we can and must set ourselves, aware of the difficulties, but determined to contribute, as educators, as scientists and as citizens, to forging the conditions for a sustainable future.

**6. Credits**

This communication has been conceived as a contribution to the Decade of Education for Sustainable Development [43] instigated by the United Nations for the period 2005-2014.

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