ENVIRONMENTAL EDUCATION AND DESIGN; The role of landscape architecture

Martin van den Toorn

Faculty of Architecture
Delft University of Technology
Berlageweg 1
2628 CR DELFT
HOLLAND

• *Abstract:*
Most people in western societies no longer have direct contact with their natural living environment and learn mostly about environmental problems from media. This lack of direct experience with the natural environment in urban landscapes will give rise to a different view on 'environmental education'.
In this paper we approach environmental education from an integrated point of view that also includes design of the daily environment. This environmental education can be distinguished in three interrelated steps. First of all: learning about the daily environment from primary school to University. This education should focus on the dynamics of life cycles like water, energy etc.. At the same time it should relate the daily environment on the local scale to the global scale. Secondly, to create new experiences in the daily life where 'learning by doing' or 'learning by experience' gets special attention. There, young people can practice, find out and experience for themselves what they learned in the first step. Thirdly to design daily environments that show how (natural) systems work and function in the daily living environment. For instance, show where energy comes from or how the water system works. This will be for a large part the design of public space. All three steps should be consistent with each other; that is, what you learn at school should be experienced in the daily environment and be visible. It will mean that not only our concept of 'environment' will be extended far beyond ecology and traditional views of nature, it also focusses on the daily living environments of urban people and makes people directly aware what they can do in their daily lives with the global concept of sustainability.

• *Keywords:*
environmental education; landscape architecture; urban design; water as a design material; education and design; daily living environment; sustainability; public space

1. Introduction

• The Dutch context
This paper is for the larger part written from a Dutch context. For 'environment' and consequently 'environmental education' this means that one problem is very characteristic in Holland and that is density. Not only density of population but also density of tourists, cattle and not to forget a transportation network (ship, train, car, truck) that is fully equipped for the European scale with two mainports: Schiphol airport and the Port of Rotterdam. This density of people, animals and use leads to problems relating to environment, space, natural and cultural qualities. Despite these densities there is a situation of improvement of the environment, for instance Dutch agriculture has lowered its pollution to almost unbelievably low and very acceptable standards nowadays. Our natural environment is not doing bad; on the contrary, due to a very strict natural policy and regulations, the state of natural qualities is still improving. Despite these positive effects, Dutch policy for sustainability needs a broader context. It needs a scope that goes beyond ecology and nature conservation; eco-

nomic, social and cultural dimensions need to be integrated [4]. In fact the whole country is urbanised, even-though large parts still look rural from a morphological point of view. These fairly recent developments have far-reaching consequences for the perception and use of green space. People are searching for new dimensions of leisure, more experience-based, a focus on well-being and compensation for the stressfully daily life.

• Changing perspectives in the relation between nature and culture; lost contact with nature

Most people in western societies no longer have direct contact with their natural living environment. Very few people work in a situation where they are in close contact with the natural environment in such a way that they understand the working of that system. A hundred years ago, still half of the labour force in Holland worked in agriculture. Today that is less than 2%. A similar trend has been taking place in fishing. Right now in Holland, the rural landscape has not only a function for agricultural production but also as a visual resource for people living in cities, space for leisure and experience of nature. So the concept of 'landscape' has changed dramatically. The whole country can be considered as an 'urban landscape' where the rural landscape is not only used for agricultural production but also as a 'park landscape' for people from the cities. People nowadays learn mostly about environmental problems from media, Mommaas, [31] speaks of the process of 'mediatizing'. The media are the main 'producers' or 'mediators' for images of life styles. The growing influence of the internet will continue this trend and possibly enlarge it. This lack of direct experience with the natural environment in urban landscapes leads to alienation of the natural environment [14], resulting in not being aware of what is going on really and consequently to a state of indifference towards the quality of the environment. Focus on insight and understanding of environmental problems, of a broader context will demand a different view on 'environmental education'. Further on there are growing controversies between what people want and what is good for the environment. Like the increase of mobility and its growing pollution (cars, airplane). Finally it is more and more difficult for people to see the relation between pollution, global environmental problems and their own role in solving these problems; in fact this is a problem of scale.

• Terms, definitions and meanings

The terms 'environment', 'sustainability', 'nature' and 'landscape' can have very different meanings and connotations.

'Environment' is a key term in this paper. It has a connotation of ecology and pollution. More and more 'environment' is seen as comprising also social and cultural aspects.

'Sustainability' is largely a concept that takes into account the long term; we should leave the earth's resources for future generations. It is understandable and quite acceptable in general for many people but it seems difficult to achieve and make operational in everyday life.

'Nature' is a term with very different meanings. Living in urban landscapes does not mean that there is no nature; it also rains in downtown Paris. For most people 'anything green' represents nature, for many ecologists 'nature' means 'untouched by man'.

'Landscape' has not only physical dimensions (the land) but also social aspects. The relation between man and environment is crucial for the concept of landscape as it is used in this paper [51]. 'Landscape' also includes a viewpoint [29]; the way people look at the landscape is for a large part determining what they focus on and what they see and experience.

• Research questions

The overall research problem for this paper is: how to develop an individual awareness for environmental problems in the context of daily life based on insight. Thus enabling people to think, act, decide for themselves how to deal with the quality of their living environment, both locally and globally. We have distinguished three research questions to approach this problem:

- How will the concept of 'environment' change and how will that affect 'environmental education'?

- What will be the main strategies in the changing scope of environmental education?

- What can design disciplines like landscape architecture contribute to the need for a growing awareness and comprehension of global environmental problems facing us in the future?

2. The changing scope of environmental education

Finding solutions for environmental problems is not only a technical problem, it requires an understanding of how individuals and organizations think, what they care about, what motivates them, how they communicate and the conditions under which they behave most reasonably and creatively. Here lies a key issue for environmental education in the future. This will mean developing viewpoints and understanding of the environment as a

social, economic and natural system, among people.

2.1 Environmental education today

Environmental education started in urban and industrial societies in the 60-ies. The main idea was to move from nature appreciation to informed citizens that will allow them to take informed decisions on the environment. William B. Stapp, who died in 2001, is considered the founder of the international environmental education movement. He was founding director of environmental education for UNESCO and, in that capacity, implemented programs in 120 nations. Environmental education refers to organized efforts to teach about how natural environments function and, particularly, how human beings can manage their behaviour and ecosystems in order to live sustainably. The term is often used to imply education within the school system, from primary to post-secondary. However, it is sometimes used more broadly to include all efforts to educate the public and other audiences, including print materials, websites, media campaigns, etc. Environmental education should also increase public awareness and knowledge of environmental issues and challenges. It should enable people to gain an understanding of how their individual actions affect the environment, acquire skills that they can use to weigh various sides of issues, and become better equipped to make informed decisions. It should also give people a deeper understanding of the environment, inspiring them to take personal responsibility for its preservation and restoration and future development. It should above all be a learning process that goes beyond primary school education [17].

2.2 Making people aware of nature and natural systems in their own living environments

Rogers [38] makes clear how difficult it is for ordinary people to operationalise the concept of sustainability in the Australian context on the subject of 'sustainable cities'. If sustainability is a 'collective responsibility', then different groups will get different responsibilities. She states, *(…) it is first of all the consumers who have to take responsibility not business and industry.* Especially in the case of 'sustainable cities', the trend will be to focus more on compact cities instead of suburban development. Rogers & Power [39] come to similar conclusions as a basis for a large urban renewal plan in Britain. Still large numbers of people prefer suburban type of housing. Also in Holland, the recent 'VINEX' - extensions are largely in suburban typologies [23]. It is not that people dislike cities or urbanity but apparently there are important aspects that are lacking in the city as a place for dwelling, like facilities for children to play safely. Also easy access to the city might be a factor that plays a role. In the given circumstances it will be very difficult to convince people of the advantages of the compact city and it will take strong measures of governments to create conditions that will favour this change of view. There is an urgent need to show people how they relate to their natural environment in an urban landscape [24]. This could also affect the way people look at their living environment; their viewpoints.

2.3 The search for an integrated approach for environmental awareness at a global scale

Many authors have published on environmental problems and what education could contribute to the solution of those problems. Here we have chosen a particular approach that goes further than only education in formalised educational programs at schools and universities that focus on pollution, climate change, ecology. Motloch [33] describes our environmental problems in a larger context than only pollution and exhausting of resources; it is also a matter of view, of mentality. He states:

(…) Recent and especially post-World War II cultures have been educated to remain uninformed about systems, to disconnect from context, and to use nonrenewable resources to sustain short-term comfort. We have not been taught to be sensitive to the reduction in system potential by our reductive decisions, or to see system breakdown as interconnected with our daily lives.

He sees the relation to education as crucial:

(…) People in Western societies especially have been taught not to address ecological- and human-system complexity, or the world as dynamic system. They have been educated to "engineer the world" and see resources as inert commodities to be mined, consumed, and converted to waste. They also have not been educated to see themselves as operating within natural laws and as part of regenerative systems, to address resources as parts of living systems, to integrate their actions into life-cycle flows, to be participants in regenerating the resources they ultimately rely on, or to "ecology the world."

Motloch refers to a particular view on the relationship between man and environment and he discusses an alternative approach that educates people to facilitate societal reconnection to the life forces of the universe, life-cycle dynamics, the eco-

logical and cultural landscape, and its human and nonhuman inhabitants [35].

2.4 Scope of environmental education in the future

Environmental education no longer limits itself to ecology, in fact it comprises the living environment of people; the relations between man and environment in the broad sense. 'Environment' in the context of environmental education should be seen as the human environment in which the natural environment can be distinguished but not separated. In that way environmental education could give people a better understanding of the backgrounds of the environments they live in and inspiring them to take personal responsibility for their living environment. Environmental education should not be limited to schools; also other means of learning like public participation, discussion groups, internet learning should be part of it. In contemporary industrial societies and even more in the information age, people have no longer an understanding of their environment from direct contact with it. Most people are confronted with their environment and environmental problems through the media; tv, newspapers, magazines, internet. So you could see the environmental problem not only as environmental problems as such but also as a communication problem. Communication not only coming from media but also between environment and people that can lead to informed people that have gained insight by direct experiences in their own living environment. How to make people aware of the place and role of the natural system in the contemporary daily living environment? In this paper we want to draw attention for the importance of active learning, learning by doing and experiencing. In education in general, there is a growing interest in this way of learning [16]. It is interesting to see that in all design education 'learning by doing' has always played a key role [40; 43; 37]. Another interesting development in this context is the role of active learning in museums [5; 6; 7]. Key issue for the future is how we can relate environmental issues we hear from the media to our local environment and to global issues at large. How can we understand our contemporary relation to nature and thus being able to form opinions ourselves on the environmental issues in general? Here design disciplines come in view; in this paper we will focus on landscape architecture.

3. The role of landscape architecture in the design of urban landscapes

We have stated that relating local environmental issues to the global state of the earth needs an integrated approach. This should enable people to experience their living environment in a way that they can comprehend the natural process in headlines and being able to decide for themselves as informed citizens. Take for instance the increasing shortage of fresh water, even in Holland. It would help very much to create an awareness for that, if people would understand the water-system in their living environment. For instance in Holland, very few people are aware that they live in a polder. Most people also do not know how a polder as a water-system works. In the design of public space, this could get more attention. In the case of the polder, the location and space around the pumping station could be designed to show its importance for the polder and the people. In the design of the daily living environment, landscape architecture can play a key role especially in the design of public space. We want elaborate on that in this paper but first we will start with a short introduction on what landscape architecture is as a design discipline.

3.1 What is landscape architecture?

Landscape architecture is a practice-based design discipline that has already a very long tradition in the making of gardens and parks. Since the beginning of the 20th century for the first time the design of landscapes became part of professional activity of landscape architects. This meant in Holland, the design of the landscape as public space like polders, landscape plans for motorways, urban green plans. Key characteristic of landscape architecture is its working with natural materials in a natural system; the dynamics of landscape form and design. Consequently it also means thinking, designing in the long term, in different time scales [21; 41; 42; 25; 33; 19]. There are a great many definitions of what landscape architecture is [8; 54]. For this paper we have chosen one that is up to date and relevant for the topic we are dealing with; environmental eduction and the role of design disciplines, in particular landscape architecture. The European Council of Landscape Architecture Schools (ECLAS) defined 'landscape architecture' as:

Landscape Architecture is both a professional activity and an academic discipline. It encompasses the fields of landscape planning, landscape management and landscape design in both urban and rural areas at the local and regional level. It is concerned with the conservation and enhancement

of the landscape and its associated values for the benefit of current and future generations. (http://eclas.org/content/landscape-architecture/landscape-architecture_main.php, 2004).
It is a definition that covers the work field of landscape architects and the scientific part as a discipline in academia. Vroom [54] makes a distinction between 'landscape planning, landscape design and urban design'. He views that the distinctions are becoming 'blurred' as he mentions it. The scope of the profession is developing so rapidly that these distinctions do have a general headline of approach, methodology and practice but are more difficult to precisely limit the boundaries between the three. The yearbooks of Dutch design projects in 'landscape architecture and town planning' [12] but also other sources like [20; 21; 25; 33; 41; 42] are demonstrating the same. Fleming et al., base their description on the historical development. ECLAS emphasises the distinction between discipline (academic, scientific) and profession (practice). Vroom, more or less combines both and emphasises the relation with nature, natural systems and consequently the fundamental dynamics of landscape form and design. In landscape architecture we distinguish three different aspects in the same landscape; the land (natural system), the landscape (man's use of the landscape) and design interventions in both (landscape architecture). In the context of this paper especially the interrelations between all three is a key issue. In the course of time main design orientation in landscape architecture used to be on the cultivating of land and its resources, potentials. In the second part of the last century 'growth management' — how to accommodate growth — grew in importance [33]. We now move gradually to a more 'people oriented' approach; more sustainable and at the same time taking into account economic and social use of space.

3.2 Design of man-environment relations in the future; the design of public space
• Sustainability as design goal
If we take sustainability as an overall design goal for the future, we have to work out how this can be achieved in the design of daily living environments. We have already referred to the changing viewpoints on 'environment' and 'environmental conditions'; it is extended beyond the ecological dimension. Sustainability is drawing attention on developments in the long run; the time scale comes into the picture. Thompson [47] considers three overlapping value systems to influence the profession of landscape architecture:

- natural systems, nature; ecological thinking, environmental values
- socio-economic systems, society; community thinking, economic values, social values
- cultural systems, culture; cultural thinking, aesthetic values
It is not only interesting to see what dimensions Thompson considers as important value systems in landscape architecture, he also pleas for an integration of all three in design. So design for him is not only solving a spatial problem but at the same time taking into account 'values'. According to Thompson, the richest design pays attention to all three value systems and at the same time integrates them. He calls this 'trivalent design'. In this context, design can be seen as a 'cultural act' and gets a cultural dimension, a contribution to contemporary culture. He also makes a distinction between the different discourses related to the value fields in landscape architecture. In the environmental discourses he distinguishes three subcategories of discourses:
- harmonisation; how to 'harmonise' an intervention with the existing situation?
- sustainability; how can design interventions focus on renewable resources for the future?
- health; how can design interventions contribute to physical and social health and well-being?
It means that sustainability for Thompson is not the only goal in design. 'Harmonisation' is a common feature among designers. 'Health' is mostly implicit in landscape design.
• Design with nature
The design of man-environment relations in landscape architecture got a new influx with the publication of the book of McHarg: 'Design with nature' [28]. McHarg works out an approach where the viewpoint of nature, the natural system is explicitly taken into account. He also works out a systematic and explicit methodology for researching the landscape as a system, both social and natural. Although his examples are for the most part on the large scale, the same principles could also be applied on a smaller scale. McHarg's viewpoints have not only influenced the profession by introducing a more systematic analysis of the landscape. His book also made clear relations between ecological, social and economic aspects of the landscape and the role of design in society at large.
• Design in landscape architecture can also be seen as a way of adding new complexities.
Design is not only about solving spatial problems of accommodating the program, it can also give new meanings or create conditions so that people

can attach new meanings to their environment. This cultural dimension that is also related to aesthetics, what we visually appreciate or not, is becoming more and more important in contemporary western society. The basic needs like dwelling, work are for a great deal fulfilled. People are searching for more, for well-being, for new dimensions in personal experiences. For all three aspects we have mentioned, the future of man-environment relations will for a great deal refer to the design of public space [15; 30; 11; 53]. Especially in Europe an important cultural condition is the quality of public space. Here we see new challenges for landscape architecture in the future.

3.3 In search of new relations between nature and culture

• Historic relations between nature and culture
Our relation with nature has evolved over time. We have chosen three sources that have researched the relation between man and nature from a historical point of view but that put different emphasis in their studies. Glacken [10] focuses on the classical period and ideas especially on philosophical, theological and social backgrounds. Thomas [46] refers mainly to the British situation; England, Scotland and Wales sometimes in European context. Passmore [36] is putting his main emphasis on the contemporary period of the second part of the last century. Glacken [10] describes in great detail how the relation between nature and culture has changed over time. He puts great emphasis on the backgrounds of these changes from theology, philosophy, agriculture, forestry and science. The classic period offered a harmonious relation between man and environment, between culture and nature in many ways. The Middle Ages is a transition period to the modern times. It was also a period of great environmental changes; clearing of forests, building of cities, drainage of swamps. The cultivation of nature took place by trial and error; breeding of natural material, cultivating of land. The Modern Times starts with the Renaissance. It is dominated by the development of science that focusses on cause and effect. By scientific discovery of nature, the desire to control nature became more and more important. In the nineteenth century the scientific approach was applied to the earth as geographical space; the time of discoveries, plant taxonomy, geology. This led eventually to the first ecological approach where nature was studied as a natural system. Thomas [46] describes the gradual development of the love for nature and the growing new relations with it in the form of hunting, tree plant-

ing, gardening, for the well-to-do living in the countryside in mansions with beautiful gardens and eventually the design of public parks in cities. He states that the idea of the 'Garden city' was not invented by Ebenezer Howard in the 1890's; it was formulated in 1661 by John Evelyn, *who had been much impressed by the delicious walks and avenues he had seen on his travels in the towns of France, Italy and the Netherlands*. He considers the cultivation of nature, the protection of animals as major steps in the development in the relation between man and nature until the end of the 18th century. Passmore [36] deals mainly with the contemporary period of the last part of the 20th century; pollution, environmental crisis and population growth. He notes the often anti-human bias of many ecologists. Both size and distribution of population play a role but the relation between population growth and religion is of greater influence. The Roman Catholic religion is mentioned for its population growth viewpoint. In the cooperative approach between man and nature, two types of human interventions are mentioned explicitly: the making of gardens and parks and the other: town planning. He quotes Marcuse that *parks and gardens and reservations represent a liberating as opposed to a tyrannical mastery over nature*. He considers the design of parks and gardens in the eighteenth and nineteenth century as a form of *civilising nature*. For townplanning — we would now say 'urban design' — he disagrees with the *despotic concept of perfection of the American-style grid town*. Instead he puts forward the approach of the landscape architect McHarg, to design settlements, urban development *with nature* as McHarg described in his book [28]

• In search of new relations between nature and culture in contemporary society
Mommaas [31] wrote an essay on the socio-cultural aspects of green space in Holland with the title 'In search of Arcadia'. He comes to the conclusion that the relation between nature and culture is changing in contemporary Dutch society towards a more interwoven relation where the one can no longer be separated from the other. It means that simple, one-dimensional goals of nature conservation will be no longer operational in contemporary society. The cultural dimension of nature is intricately intertwined with sustainability, biodiversity and former nature conservation. He starts with an analysis of some recent developments in the Dutch rural landscape. First he describes the move from agriculture to making new nature. This is strongly supported by Dutch nature conservation policies.

At this moment the total surface of land in agricultural use does not diminish anymore but farms get bigger so farmers either stop farming or emigrate to other countries. Still existing farmers in specific areas can get subsidies for 'nature - friendly' interventions. Secondly, he states that the use of space during leisure time has a tendency towards more active-based experiences of green space like hiking, cycling, handgliding etc.. Thirdly, the use of green space as open space for citizens is becoming more and more diverse. People not only use green space outside the city for leisure but also for dwelling (urban villa's, second homes) and for working. The phenomenon of citizens living in the countryside is not entirely new. In the 17th century rich merchants and other well-to-do people from the city, moved to the country side to live in their sumptuous mansions with beautifully designed gardens. In fact these mansions were second homes. To give form to these fundamental changes in viewpoints and use of green space, Mommaas pleas for more design influence instead of regulations, rules etc. He warns for too much commercial influence on the development of contemporary green space because it will not generate long term solutions. The traditional utilitarian and productive use of green space for agriculture, mining, fishing, infrastructure is more and more complemented by an aesthetically based, visual experience and consumptive use for sensual experiences and activities. He calls this the 'social use' use of green space that can be considered as a culturally based search for new qualities. This directly influences the relation between nature and culture and will give this relation a new contemporary dimension. This means that a growing number of people will not only seek for the 'nature of biologists' like in the old times but will seek for new experiences not necessarily associated with this type of nature. People who have a second home in the country might have a view of agricultural land, for them this is 'green space' that creates an atmosphere of space, of quietness in a stressful world. Ecologists might consider this as 'inferior' in the context of nature conservation. It could also be a regional identity based on former agricultural use or landscape architectural creations like parks, gardens or historic settlements. In fact he disagrees with the simple, one-dimensional goals of contemporary nature conservation and pleas for an integration of these ideas in a social and cultural context. Nature and culture are more and more interwoven.
• What does this mean for environmental education?

Teaching about cycles; increasing awareness and understanding of cyclical character of nature should form the core of the content in different types of education. In the earlier mentioned example of Dutch polders as part of the water-system, this could mean a special focus on the hydrological cycle and the polder as part of the water-system as a whole. Directly related to that the influence of water and waterflows on many environmental processes like vegetation development, fauna, soil formation. A second important aspect is learning by doing, by experiments and experience in the local living environment of people. In such an active type of learning, people can discover themselves the impact and consequences of interventions. In the case of the polder, people could see if you pump less, the waterlevel will rise. That will have its effect on access of terrain, vegetation development. Finally, the design of the daily living environment should show how these processes function; make them accessible and 'readable'.

4. Three major challenges that are facing us in the future

What we are facing in the future is what holds the ultimate challenges for design; the still growing mobility, problems with watermanagement in the long run and the ongoing process of (sub)urbanisation.

4.1 The growing demand for mobility

Mobility is part of our everyday culture for almost everybody. If you don't move anymore, you grow old. Being mobile is a major asset both on the individual level and at the level of a country as a whole in western society. Even though we seem to spend an equal time on traveling, commuting or whatever, compared to the last century, we are moving at much faster speeds so we are making larger distances. Our world has become much smaller or what Harvey [13] describes as 'time-space compression'. Mobility seems to be an inherited value for mankind. Traveling, transport because of trade, the search for new lands have always led to new discoveries, new worlds and in the end also to new views on the world; the landscape of the mind. The reason(s) for this seemingly restless search for mobility of mankind is looked upon differently by various authors. In Holland, with its high density of population, the demand for mobility is still growing both privately but also for economic reasons. Lemaire in his book 'Filosofie van het landschap' [22] describes the historical development of our perception the landscape. In that context he already

mentioned the difference in the contemporary experience of the landscape by driving a car on the motorway. He puts it in a context of the 'demystification of space; the perception of the western world, that has started in the Middle Ages and still is going on due to the secularisation of the western world at large. Heidegger refers to this basic attitude of man in search of himself in a different way but having similar consequences. He uses the word 'Unheimlichkeit'; man is basically a nomad and will never be able to find any place that really feels like home. So there is no other way than to keep searching for destiny; hence a culture on the move. So the need for mobility seems to be great whatever reason that may have. This is not only due to cultural or psychological reasons as above mentioned. It is also related to economic development and power. Increased mobility has been made possible by the technological developments like train, car, airplane. After the Industrial Revolution an ever increasing number of people has got access to different means of transport. It has enabled a world wide globalisation where, practically speaking, anything can take place anywhere because of easy access. The increased mobility has thus created also people, production, atmospheres to be more and more footloose. Still, where we live — our daily living environment — is one of the few places related to a physical site, with its own history and identity [1; 44]. So increased mobility has given us access to more places in the world in shorter time and thus also increased our 'placelesness'. Design of infralandscapes — landscapes that are directly or indirectly influenced by infrastructure — is essentially the design of acceleration and deceleration [49]. It is based on different design speeds; the range between the motorway landscape designed for 120 km/h related to economic activity and the enclosed garden in the city centre accessible only for pedestrians and meant as a quiet place in the city, for contemplation, rest and silence [14]. Augé [1] considers the dwelling as one of the few real 'places' that still persist in postmodern society.

4.2 The shortage of fresh water
• What is the problem with water?
Shortage of fresh water world-wide is already apparent right now but will be even larger in the future. The world population is still growing, at this moment not all people have access to good quality fresh water and finally the consumption of fresh water per person is still increasing. Water is the most valuable of our natural resources. It is, how-

ever, predicted that an alarming percentage of major cities are going to be running short of it in the next decade. How will this rising demand for water be met? Conserving water is major task for the future anywhere in the world. Water is the source of all life on earth. The distribution of water, however, is quite varied; many locations have plenty of it while others have very little. The circulation and conservation of earth's water is called the 'hydrologic cycle' [52]. The hydrologic cycle is a conceptual model that describes the storage and movement of water between the different spheres; biosphere, atmosphere, lithosphere, and hydrosphere at a given site or area. There are five processes in the hydrologic cycle: condensation, precipitation, infiltration, runoff, and evapotranspiration. These processes occur simultaneously and, except for precipitation, continuously.
- The watershed as a basis for regional planning
The aspect of sustainability in landscape planning is first of all addressed in planning and design on the basis of watersheds. A watershed is the geographic area where all water running off the land drains to a given stream, river, lake, wetland, coastal water or other water body. Watershed planning and management comprises an approach to protecting water quality and quantity that focuses on a watershed as a whole. This is different from the traditional approach of managing individual wastewater discharges, and is necessary due to the nature of polluted runoff, which in most watersheds is the biggest contributor to water pollution. Polluted runoff is caused by a variety of land use activities and may originate anywhere in the watershed. Watershed planning is sometimes a difficult subject to define because of all the different physical and climatological settings throughout the world and is depending on each watershed's unique characteristics, people, and other factors [52]. In landscape planning not only the landuse types and their possible pollution is taken into account, also the storage or infiltration of water for dry periods is part of the problem. The location of both depending on stream direction of the waterways is crucial; no polluting landuse upstream! The amount and location of water storage depends on the quantities that can be calculated on the basis of the hydrological cycle.
- Water as design material offers a wealth of possibilities for planning and design at all levels of intervention [48]. There is also a rich historical tradition in this domain [32]. In the 2nd International Architecture Biennale in Rotterdam [9], the world wide problem of water shortage was the key issue

of the Biennale and its exhibitions. As a contemporary example on the regional scale we mention a model study of the Vecht region [34]. This study is based on an integrated approach of water and water management at a regional level in an area with a rich historical context. The study makes clear how such an integrated approach on the basis of water management can form the basis for landscape development in the long run that also makes use of the historical qualities.

4.3 The growing urbanisation worldwide

The continuing increase of urbanisation worldwide and the change towards an urban landscape for most people will create a different culture in the near future; a culture of urbanity.
• We can distinguish different types of urbanisation. Just three different forms of urban development, to give an idea:
First of all the existing urban settlements that are not only growing but also are in the process of urban renewal of older parts. Especially in Europe this process is important.
Secondly there is a suburban development that started at a large scale in the US but is now common also in Europe and other parts of the world.
Thirdly there is a massive urban extension development in Asia and in South America towards large metropolitan centres.
In the context of sustainability, the overall idea is that compact cities are more sustainable than suburban forms of urbanisation. You can see already this controversial situation that is developing now.
• Contemporary ideas on urban development
Although urbanisation started already in the 'old' world, it is since the industrial revolution that it has increased rapidly, some consider it even explosively. The world wide globalisation process that is going on now, also results in more and more people wanting to live in cities and urban settlements because they hope to find work. It is not only this obvious and clear reason of employment, why people still move to cities. It is also the urban culture of offering more opportunities for meeting people, exchange of ideas that draws people to cities worldwide. Toynbee [50] adds to the role of cities the function of control and communication but above all the role as melting pot for for alien cultures and religions. People have always been attracted to this unrivaled facilities for exchange, enrichment and diffusion of ideas. A recent UN report on the state of the world population [27] draws attention for a new way of looking at cities, at living in cities and ultimately for a new view of urban culture. The director of the program Thoraya Ahmed Obaid, pleas for a view of cities and urban life that can give new challenges for people that did not live in cities before. She refers especially to politicians and decision-makers that view the city as a bad place to live with lots of pollution, crime and unemployment. Still people keep moving to cities and find in many cases new opportunities even though in the beginning this might be under uncomfortable living conditions [27; 3].
• Urbanity and the search for a new culture of nature
Like Thomas [46] has mentioned about the the manors in England, the culture of 'rural villa's' in the Roman Empire or the mansions along the Vecht in Holland [34], all products of an urban culture, there have been examples of relations between nature and culture that resulted in high quality living environments in history. We should learn from these historical examples and at the same time search for contemporary forms of environments that are urban and that can build up a new relationship with the natural environment. In large metropolitan areas the dichotomy between urban and rural will more and more disappear and be replaced by an urbanised landscape at large. This still growing urban population will be completely urbanised in their thinking and way of life and will seek for new relations with nature, wilderness and the natural environment. This new urban life style will also demand for a different urban environment. The urban population will seek for new experiences of urban nature primarily in their own living environment. It demands for a design of the living environment where direct experiences are possible. You could think of:
- Urban agriculture, where people can take part and experience how food is produced and where it comes from
- Space for cultivation of house gardens, where those who have pleasure in working outside in their leisure time can grow their own vegetables, flowers, fruits.
- Space for outdoor sporting, where people can experience in their own urban environment mountain climbing, diving, hand gliding, wildwater canoeing etc.
- Experiencing urban nature-reserves; where people can directly see and encounter rare urban plants, vegetations, birds.
- New roles of botanical gardens; places where people can take part in the cultivation of the rich diversity of exotic plants
These examples are certainly not new but are not

yet integral part of new urban living environments; they are still isolated and separated from the urban environment. Lynch [26] gives a good theoretical basis for making cities, urban landscapes that still can be applied in contemporary times. Especially the emphasis on values, on livability and safety have not changed in importance nowadays. The design of public space will be increasingly important since waterways, water-bodies and roadsystems are for a large part public space [15; 30; 11; 53]. Moreover urban governments should take a leading position in creating conditions for these types of urban life. They can play a key role in setting out new lines for the development of such an urban environment.

5. Environmental problems and design problems

Not all environmental problems can be solved by design but design problems always include life cycles of different kinds, taking into account the natural system at different levels of scale. If we look at environmental problems in a sustainable way, we always have to include the long term. This is common in landscape architecture [33; 45; 47] since interventions in the landscape always affect natural processes; design in space and time. The next step in this strategy is to integrate existing but isolated environmental concepts into the framework of environmental cycles; first of all the hydrological cycle. Water — more precisely the flows of water — basically is the medium by which the natural forces regulate the ecosystem. There is no life without water. In landscape architecture, the watersystem should always form the starting point for new interventions in the landscape. To achieve this, you always start with defining the watershed. Secondly the matter of density of use is taken into account. Here comes the socio-economic aspect in the picture. Location, density of different land use types and direction of development, define the human use of the landscape. Infrastructure forms the means that connects and regulates this. The composition of different types of land use defines also what the conditions are for each ecosystem at different scales, to achieve natural diversity. Finally we have to pay attention to the design of new experiences of nature, of ecosystems on the basis of the former steps. This last aspect is becoming more and more important in urbanised societies. A major challenge for design disciplines like landscape architecture is to make people aware of the relation between man and environment by creating experiences [2; 35] related to the natural system.

• Design of new experiences of nature
The design principles in landscape architecture have evolved historically from 'style-based' (the classical tradition of gardens and parks) to 'program-based' (the modern tradition, the design of the landscape as public space) to the contemporary 'interactively-based' (the postmodern tradition).
• This 'interactively-based' approach in landscape architecture stands for two aspects; the design process and the changed view of the landscape. Nowadays, design processes are — depending on the assignment — a mix of bottom-up and top-down, users, professionals and designers take part in it. 'Interactive' also stands for the changed perception and attitude towards the landscape in general. Already in history, people living in cities saw the rural landscape as their 'outdoor space' [18]. This process not only continues but also extends further since more and more people are living in cities. At the same time they search contact with nature, with green space more and more in an interactive way; the search for experiences like wild water canoeing, hand gliding, mountaineering, long distance walking. Two different design approaches in landscape architecture can provide new possibilities in this context:
• The 'narrative' approach
In this approach, design provides next to the functional demands of the program, 'telling a story' for instance about the history of the place. An excellent, internationally well known example is the design of the new Louvre in Paris by Pei. The 'pyramid' is a modest and more or less neutral addition to the historic setting. It first of all provides access to all parts of the museum (program). At the same time it tells the historical development of the museum over time; from the pyramid you can see where the Louvre started as a castle, you see the different parts of the museum and the relation with the urban structure of the axis of the Champs Elysée. In the architectural style you see the sequence of styles over time; the pyramid is by its materialisation very contemporary and contrasting with its historical surroundings. At the same time the form of a 'pyramid' is also a metaphor for the old times.
The 'layered' approach
Design can also be approached as 'adding new layers' to the existing landscape. In landscape architecture, 'tabula rasa' does not exist. There is always an existing situation that has specific characteristics. So you always add something to the existing site; design as transformation of the existing form.

By adding new layers, you add also 'new complexities', new ways for users to experience the landscape and attach new meanings to it. An internationally well known example is the Parc de la Villette in Paris. A former slaughter house transformed into an urban park for the 21st century. Part of the existing situation has been kept (Canal de l'Ourq, two buildings). The design can be seen as a series of layers (the pattern of follies, the green open space, the walk) that on the one hand accommodates the program on the other hand it creates new experiences for visitors of activities, people from the neighbourhood and tourists alike. Back in the 19th and 20th century, urban parks were the 'green lungs' of the city. The city was basically a bad, unhealthy place to live. The design approach for the La Villette Park was totally different; the city as a way of urban living that offers unique resources and possibilities for an urban population. So the park stands for a new form of urbanity where the urban experience is a key issue.

6. Conclusions

For the environmental education in the future a new dimension should be added; the creation of direct experiences in the environment of daily life. Thus environmental education can provide an integrated approach towards creating awareness and insight into the quality of life. These insights gained by environmental education and local experiences should also form a sound basis to become informed citizens that are able to relate these insights to the global scale. In this strategy we have distinguished three interrelated aspects:
• Towards growing awareness of people to decide themselves about environmental issues in the widest sense of the word. Learning to see relations / systems / cycles. Being able to relate local and global. Environmental education as a means of developing awareness.
• Towards new experiences of the environment in order to develop an active understanding and awareness of the environment as a dynamic system. Environmental education as an active way of learning.
• Towards a contemporary appreciation of nature, not only nature untouched by man but nature in the urban landscape, cultivated nature. Environmental education as creating readable and understandable living environments for people.

Design disciplines like landscape architecture can play an important role in creating conditions for new experiences in the daily living environment. Designers can deal with nature in a cultural way; landscape design as a contribution to contemporary culture by creating new meanings of nature. This cultural dimension of design can be considered as an act of creation new meaningful living environments for people in a globalised world.

References

>>   : English or French
>   : Dutch only

>> Anicic, B. (ed.), ECLAS European Conference of Landscape architecture schools — Conference proceedings — Landscape of the future: the future of landscape architecture education Dubrovnik, Dept. of Landscape Architecture Univ. of Zagreb, 2000
>> [1] Augé, M., Non – Lieux — Introduction à une anthropologie de la surmodernité, Paris, Ed. du Seuil, 1992
>> [2] Bloomer, K.C. & Ch.W. Moore, Body, memory, and architecture, New haven & London, YUP, 1977
>> [3] Caparros, M., State of the world population — Growing up urban — youth supplement, New York, UNFPA, 2007
>> [4] Dalal-Clayton, B. & F. Krikhaar, A new sustainable development strategy: an opportunity not to be missed, Den Haag, RMNO, 2007
>> [5] Désir [I], Désir d'apprendre — Révélez-vous, c'est l'an 2000, Paris, 1999
>> [6] Désir [II], Désir d'apprendre — 8 - 12 ans — citédoc 57, Paris, 1999
>> [7] Désir [III], Désir d'apprendre — dès 13 ans — citédoc 58, Paris, 1999
>> [8] Fleming, J. & H. Honour & N. Pevsner, The Penguin Dictionary of architecture and landscape architecture, London, Penguin, 1998, 5th ed.
>> [9] flood, the flood — de zondvloed — 26 mei-26 juni 2005 — 2nd International Architecture Biennale Rotterdam, Rotterdam, NAI, 2005
>> [10] Glacken, C.J., Traces on the Rhodian shore — Nature and culture in Western Thought from Ancient times to the end of the eighteenth century, Berkeley, UCB, 1990, 5th pr
>> [11] Goossens, J. & A. Guinée & W. Oosterhoff, Public space — Design, layout and management of public open space in Rotterdam, Rotterdam, 010, 1995
>> [12] Harsema, H. & Sj. Cusveller & R. Bijhouwer & P. van Bolhuis & N. van Keulen & F. Meyer, Landschapsarchitectuur en stedebouw in Nederland 01–03 — Landscape architecture and town planning in the Netherlands 01 – 03, Bussum, Thoth, 2004
>> [13] Harvey, D., The condition of postmodernity — An enquiry into the origins of cultural change, Cambridge US / Oxford UK, Blackwell, 1996
>> Jacobs, J., The death and life of great American cities — the failure of townplanning , Middlesex, Penguin, 1972
> [15] Josseling de Jong, F. de, Atlas voor de openbare ruimte — Leidsche Rijn Utrecht, Utrecht, 1999
> [16] Kallenberg, A.J. & L. van der Grijspaarde & A. ter Braak & C.J.

van Horzen, Leren (en) doceren in het hoger onderwijs, Utrecht, Lemma, 2003, 1e dr., 3e oplage

>> [17] Kepes, G. (ed.), Education of vision — Vision + value - series, New York, George Braziller, 1965

> [18] Kooij, P., Mythen van de groene ruimte, Wageningen, WUR, 1999

> [19] Kroonenberg, S., De menselijke maat — De aarde over tienduizend jaar, Amsterdam/Antwerpen, Atlas, 2006

> [20] Landschapsarchitektuur, Landschapsarchitektuur — Tentoonstelling van Staatsbosbeheer — Landschapsbouw, Utrecht, 1985

>> [21] Laurie, M., An introduction to landscape architecture, New York, American Elsevier, 1976, 3rd pr

> [22] Lemaire, T., Filosofie van het landschap, Bilthoven, Ambo, 1970

> [23] Lörzing, H. & W. Klemm & M. van Leeuwen & S. Soekimin, VINEX! — een morfologische verkenning, Den Haag/Rotterdam, RPB/ NAI, 2006

>> [24] Lowenthal, D., Geography, experience and imagination: towards a geographical epistemology, Annals of the Ass. of Am. geographers 51(1961) - 3, p 241-260

>> [25] Lynch, K., Site planning, Cambridge, MIT, 1974, 2nd ed/4th pr

>> [26] Lynch, K., A theory of good city form, Cambridge, MIT Press, 1981

>> [27] Martine, G., State of the world population — Unleashing the potential of urban growth, New York, UNFPA, 2007

>> [28] McHarg, I.L., Design with nature, Garden City, Doubleday & Co, 1969/1971

>> [29] Meinig, D.W. (ed.), The interpretation of ordinary landscapes — geographical essays , New York/ Oxford, 1979

> [30] H. Meyer & F. de Josselin de Jong & M.J. Hoekstra, Het ontwerp van de openbare ruimte — De kern van de stedebouw in het perspectief van de eenentwintigste eeuw — Deel 2, Amsterdam, SUN, 2006

> [31] Mommaas, H., Op zoek naar Arcadia — Over de sociaal-culturele dimensie van de groene ruimte, Tilburg, 2003

>> Mooney, P.F., Shifting ground — Landscape architecture in the age of new normal — L'architecture de paysage à l'ère de la nouvelle normale — Proceedings, Vancouver, CELA, 2006

>> [32] Mosser, M. & G. Teyssot (eds.), The history of garden design — The Western tradition from the Renaissance to the present day, London, Thames & Hudson Ltd., 1991

>> [33] Motloch, J.L., Introduction to Landscape Design, New York, John Wiley & Sons Inc., 2001, 2nd ed.

> [34] Nieuwenhuijze, L. & R. Eijsink & D. Hamhuis & N. Hazendonk & B. Olthof & R. Wetzer Voorbeeldplan Vechtplassengebied — Een bondgenootschap tussen drinkwaterwinning, natuur en recreatie, Hilversum/Utrecht, 1993

>> [35] Pallasmaa, J., Lived space — Embodied experience and sensory thought Geleefde ruimte — Belichaamde ervaring en zintuiglijk denken, Oase (2002) #58, p 13-35

>> [36] Passmore, J., Man's responsibility for nature — ecological problems and western traditions, New York, Charles Scribner's Sons, 1974

> Planologische, Planologische diskussiebijdragen — Thema Plannen met water, Delft, 1998

> [37] Prak, N.L., Geschiedenis van het ontwerponderwijs, De Bilt, Cantecleer, 1980

>> [38] Rogers, J., Beyond the Rhetoric: Sustainability of What and For Whom?, in: Mooney, 2006, p 142-147

>> [39] Rogers, R. & A. Power, Cities for a small country, London, 2000

>> [40] Schön, D.A., Educating the reflective practitioner — Toward a new design for teaching and learning in the professions, San Francisco, Jossye-Bass Publ., 1987, 1st pr.

>> [41] Simonds, J.O., Landscape architecture — The shaping of man's natural environment, New York, 1961

>> [42] Simonds, J.O., Landscape Architecture — A manual of site planning and design, New York, McGraw-Hill, 1997, 3rd. ed.

> [43] Smienk, G. & J. Niemeijer, De hand van de meester — Het ontwerponderwijs in de praktijk, Rotterdam, 010, 2000

>> [44] Sopher, D.E., The landscape of home — myth, experience, social meaning , in: Meinig, 1979, p 129-153

>> [45] Steiner, F.R., The living landscape — An ecological approach to landscape planning, New York, McGraw-Hill, 1991

>> [46] Thomas, K., Man and the natural world — A history of modern sensibility, New York, Pantheon Books, 1983

>> [47] Thompson, I.H., Ecology, community and delight — a trivalent approach to landscape education, in: Anicic, 2000 p 89-105

> [48] Toorn, M. van den, Water als ontwerpmiddel in de Tuin– en Landschapsarchitectuur — Een vergelijking van enkele voorbeelden op het regionale niveau, in: Planologische, 1998, p 83–92

>> [49] Toorn, M. van den, Infralandscapes: the design of acceleration and deceleration, in: Vries, 2001

>> [50] Toynbee, A., A study of history , New York, Weathervane Books, 1979

>> [51] Tuan, Y.F., Space and place — the perspective of experience Minneapolis, Univ. of Minnesota Press, 1977/2005, 4th pr.

> [52] Verhallen, J.M. (red.) Collegedictaat "Integraal Waterbeheer", Lelystad, RIZA, 1999, 3e dr.

>> Vries, J. de (ed.), ECLAS - Conference proceedings Larenstein - The Netherlands, Velp, 2001

>> [53] Vroom, M.J. (red./ed.) Buitenruimten — ontwerpen van Nederlandse tuin– en landschapsarchitecten in de periode na 1945 — Outdoor space — Environments designed by Dutch Landscape Architects since 1945, Amsterdam, Thoth, 1992

>> [54] Vroom, M.J., Lexicon of garden and landscape architecture, Basel, Birkhäuser, 2006

www.rmno.nl
www.nvtl.nl
www.hns.nl
www.vista.nl
www.unfpa.org
www.eclas.org
www.iflaonline.org
www.asla.org
www.thecela.org