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Tymon Zielinski
Iwona Sagan
Waldemar Surosz *Editors*

Interdisciplinary Approaches for Sustainable Development Goals

Economic Growth, Social Inclusion and Environmental Protection

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Preface

The impacts of climate change are already being felt on every continent, and according to the IPCC, the world's greenhouse gas emissions are continuing to increase. On January 1, 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development officially came into force. There are 12 of the 17 SDGs that involve taking action on climate change. For sustainable development to be achieved, it is crucial to harmonize three interconnected core elements: economic growth, social inclusion, and environmental protection.

In this book, we provide scientific basis for a number of modern approaches and state-of-the-art methods of monitoring both the environment and social behavior and human expectations toward the protection of environment. The authors of the papers discuss these issues from different research perspectives, from physics to social sciences, and they point out the challenges and future scenarios based on the results of scientific activities.

Sopot, Poland
Gdansk, Poland
Gdynia, Poland
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Tymon Zielinski
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Introduction

Iwona Sagan, Waldemar Surosz and Tymon Zielinski

Climate change processes are affecting every region on every continent of our planet and thus disrupting all economies and influencing lives, on a daily basis. To make the situation worse, these changes will have a significant impact on humans and their communities as well as the entire natural environment for the next decades (IPCC 2013; Pelling et al. 2015).

Due to climatic changes we are experiencing changes, which have significant impact on every aspect of our environment with variations in weather patterns, rising sea level, and increasingly more frequent and more extreme weather events. The greenhouse gas emissions, which are a key factor in driving climate change, are at very high levels, highest in history, and unfortunately, continue to rise. The climate projections show that if nothing changes in terms of these emissions, the world's average surface temperature will be increasing over the 21st century and may exceed 3 °C over the next 100 years. This warming up will not be uniform, some regions of the world are likely to warm even more (IPCC 2013).

It is an undisputable fact that the climate change is caused by human activities and poses a major threat to the way we live and the future of our planet. In order to face these changes and make an attempt to create a sustainable world for everyone, humans need to address the climate change in the most comprehensive way (IPCC 2013; Ruwa et al. 2017a, b).

One of the most significant steps, and the real foundation to improving people's lives and fulfill the assumptions of the sustainable development is to provide quality education to everyone, independent of region, sex and status. In recent years, significant progress has been made towards increasing access to education at all levels, and as a result basic literacy skills have improved tremendously. This progress

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however, is far from satisfactory and even greater efforts must be made in order to make even greater leap to secure access to universal education by all people (UN; Fazey et al. 2016).

It is everyone's inalienable right to have access to clean, potable water. Humans strive to live in such world, and we know now that there are sufficient water resources on earth to achieve this. However, such common problems as water scarcity, its poor quality, often resulting in poor hygiene as well as low food security, have a variety of impacts on people's choices and educational opportunities across the world. (UN; Denton et al. 2014; Pelling et al. 2015).

Another environmental problem involves deforestation and desertification, both caused by human activities and climate change. These processes are of a key importance and are among the major challenges to obtain sustainable development.

Wild forests cover some 30% of the planet's surface. Not only do they serve as food supplies and shelters, forests play a major role in combating climate change effects, throughout the protection of biodiversity and providing homes to many indigenous populations. Nevertheless, it is as much as 13 million hectares of forests that are being destroyed every year and the further degradation of drylands has led to the desertification of 3.6 billion hectares (UN). People are getting increasingly aware of the importance of making every effort to manage forests and combat desertification.

Climate change is a global issue, no borders stop the changes, since e.g. adverse emissions somewhere will sooner or later affect people somewhere else. Therefore, climate change requires solutions that need to be addressed and hence coordinated at the international level and international cooperation is necessary to fight the adverse impacts of the global changes.

The world had turned in 2015, when representatives of most world countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). On 1 January 2016, the 17 Sustainable Development Goals of the 2030 Agenda for Sustainable Development came officially into force. Twelve out of the 17 SDGs involve taking action on climate change.

Later on, in 2016, the Paris Agreement on climate change entered into force. This Agreement specified the obvious requirement to reduce the rise of global temperatures (UN).

For sustainable development to be achieved, it is crucial to harmonize three interconnected core elements: economic growth, social inclusion and environmental protection. The optimistic news are that every year, more affordable and reliable solutions appear and thus people are able to turn into cleaner, more resilient economies. People realize the seriousness of the critical state of the world environment and undertake measures to speed up the changes towards renewable energy and a range of other measures to reduce emissions and increase adaptation efforts (UN).

People have a wide range of a variety of choices of potential adaptation and mitigation pathways. It is however obvious, that all these choices are associated with synergies and trade-offs, which have impact on people's lives (Denton et al. 2014; Fazey et al. 2016).

We expect that the adaptation impacts will be mostly positive for sustainable development, and thus on the SDGs as well. Agriculture and health issues are among especially privileged sectors due to ecosystem-based adaption. There may occur negative impacts of such transformations, with hidden trade-offs in adaptation pathways and risk of reinforcing of the existing inequalities, potentially leading to lock-ins and poverty traps (Fazey et al. 2016).

Pursuing climate mitigation measures generates benefits on a number of various sustainable development levels, and advance short-term targets under the SDGs. Best available technologies to increase efficiency in the use of resources, at all levels, from local to global, help to advance toward the 1.5 °C target, while the technological and behavioral changes will help to recognize the full range of mitigation (Denton et al. 2014).

In this book we provide scientific basis for a number of modern approaches and state-of-the art methods of monitoring both the environment, social behavior and human expectations towards the protection of environment. The authors of the papers, young scientists, discuss these issues from different research perspectives, from physics to social sciences showing the challenges and future scenarios based on the scientific evidence.

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Urban Green Space as a Tool for Cohesive and Healthy Urban Community

Joanna Stępień

Abstract Urban green spaces play a significant and varied role for preserving high quality of urban life in increasingly urbanized societies. They provide wide range of advantages that support health and subjective well-being of city residents. In many cases, however, these benefits are not fairly distributed across diverse urban populations. This paper presents an overview of the role of urban greenery for city dwellers and discusses the shortage of similar studies in post-transition countries of Central and Eastern Europe, on the example of Poland. The main aim is to take a look on how urban natural settings can be planned and managed in ways that are more meaningful to different groups of people. The results of different studies provide us with knowledge on how to plan and design green spaces for various demographic and socio-economic cohorts in modern cities, although there is still a significant deficiency of dedicated researches, particularly in less developed countries.

Keywords Urban green spaces · Subjective well-being · City residents' health

Green spaces have been founded in cities since the beginning of their existence, initially to ensure nourishment security and for aesthetic reasons. At a later stage, sanitary benefits closely related to urban green settings became increasingly important. However, rapid economic development and corresponding population growth observed in late XX century accelerated public investments, particularly in high-developed regions and dense cities. As a result, decision-makers prioritised economic growth over green spaces as they responded to new socio-economic pressures. Protecting or promoting urban green areas was unsuccessful because their contribution to economic production was greatest when they were sold and developed (Kumagai et al. 2014). Nowadays, facing the dominant economic thinking we are under a pressure to justify the existence of green spaces in cities by

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using economic arguments. Many recent discussions on human-nature relationships have adopted the perspective of ecosystem services which emphasize that nature provides people with many benefits. Recent reviews of the literature have shown that urban green spaces are indeed important for city dwellers' health and well-being and environmental sustainability, although the specific mechanisms for these benefits are often complex (Kabisch et al. 2015).

1 Urban Green Space, Well-Being and Health

Currently, there is no universally accepted definition of urban green space. This concept may include all places with 'natural surfaces' or 'natural settings', but it also comprises specific types of urban greenery, such as street trees and 'blue areas' which represent water elements ranging from ponds to coastal zones (World Health Organisation, 2016). In broad terms we can treat urban natural areas (green and blue) as all natural areas of public value, both terrestrial and aquatic, which offer important opportunities for sport and recreation and also function as visual amenity (urban forests, parks, squares, beaches, sea, lakes, rivers etc.). The concept of urban green and blue space system emphasizes the quality and the quantity of urban and peri-urban green and blue spaces (Turner 1996; Rudlin and Falk 1999), their multifunctional role (Sandström 2002), and their role in connecting different environments (Van der Ryn and Cowan 1996). The introduction of urban green and blue system as a coherent planning entity creates a framework for economic growth, nature conservation and public health promotion in urban development (Walmsley 2006; Schrijnen 2000; Van der Ryn and Cowan 1996). In policy terms, it is important to focus on urban green space that is open to the public particularly when considering universal green space access for all urban residents, regardless of socioeconomic circumstances. Identifying and assessing the potential of natural space and determining its suitability for meeting the needs of city residents who are users of those spaces correspond with the idea of valorization (Węsławski et al. 2009).

Environment and health are main areas (apart from financial situation, job, leisure, and housing) that constitutes the concept of subjective well-being referring to how people experience the quality of their lives based on their emotional reactions and cognitive judgments (Van Praag et al. 2003; Dennis and James 2017). Modern scholars on well-being and happiness believe those concepts to be similar, and they can also be used in empirical studies on the level of community health (Czapiński 1992, 2000; Persaud 1998). Health as a welfare is sometimes identified with a sense of good quality of life, though this idea is much broader.

Subjective well-being is positively associated with health and people who rate their general health as good tend to experience better self-reported well-being to those who rate health as poor (Okun et al. 1984). However, the idea of health itself is ambiguous and difficult to define. In the colloquial meaning health means the absence of disease or ailment. In professional terms, i.e. formulated by

representatives of various scientific disciplines, there is no homogenous conceptualization of health (Piątkowski 2002).

The World Health Organization indicates a broad definition of health as full physical, mental and social well-being. Currently this definition from 1948, is criticized as too extensive which leads to ambiguous interpretation (Heszen and Sęk 2008). More specific concept treats health as a value. In this concept, health and disease, similarly to other values are considered separable. Health has a positive value which people seek for, while disease has a negative value, which people try to avoid. Understanding health as values is particularly useful in health promotion, because it helps to explain why people take actions to protect their health (Gniazdowski 1990).

Taking action aimed at health improvement is likely when it is treated as autotelic value, that means being important itself regardless of other values. However, for some people, health is an instrumental value, which is only a means to achieve other goals. In this context another values may be more important and will be reached at health expense (Heszen and Sęk 2008). Understanding the mechanism of treating health as a value can be useful in explaining recreational and sport activities (pro-health behaviors) taken by city residents, in the context of urban natural spaces usage and specifics of social structure. Social scientists refer also to the concept of health as a lifestyle that reflects specific position occupied by the individual in the social structure and its economic status. Lifestyle, and therefore preferences and choices made by people and their behaviours relate to ways of spending free time and taking care of their own health (Ostrowska 1997, 1999, 2000).

Within the social sciences (see Gniazdowski 1995; Ostrowska 1997, 1999) the issue of lifestyle is considered to be very complex. According to sociological approach, lifestyle is a reflection of belonging to a social class and an expression of socio-political, economic and cultural system. People represent through their lifestyle social and cultural influences. Human preferences, apart from social stratum and economic status, control patterns of spending leisure time. Thus, health-related behavior is a reflection of socialization process and consists of habits positively or negatively associated with health.

2 The Role of Urban Natural Settings for City Dwellers' Health and Subjective Well-Being

Urban natural spaces are of strategic importance for maintaining a high quality of life in increasingly urbanized societies (Chiesura 2004). The essential contributions of nature to the quality of urban life include the generally known environmental benefits of to the air, water, soil, and the ecosystem as a whole (Chiesura 2004), the psychological and physical benefits of reduced stress to citizens (Kuo et al. 1998) through the encouragement of physical activity and the extension of elderly

people's life span (Takano et al. 2002), and the social and economic benefits to the city of increasing social integration and interaction among neighbours (Coley et al. 1997). Urban natural spaces play also an important role from a social perspective by promoting a sense of safety, social support and cohesion, and integration (Coley et al. 1997; Jay and Schraml 2009; Kuo 2003; Maas et al. 2009; Peters et al. 2010). Due to their unique benefits, natural areas have been recognized as one of the most important components of urban areas.

Although the evidence remains mixed (see Badland et al. 2010), some studies show that the availability of natural spaces disproportionately benefits more affluent communities. Other researches have shown more socioeconomically deprived areas and areas with high ethnic minority populations may have poorer quality natural areas (Crawford et al. 2008; Pearce et al. 2007; Timperio et al. 2007), which in turn amplify social inequalities. The link between an individual's socio-economic position and their health is well-established (Bartley et al. 1997; Brunner 1997; 1997). Furthermore, epidemiological studies have provided evidence of a positive relationship between longevity and access to green space (Takano et al. 2002; Tanaka et al. 1996), and between green space and self-reported health (De Vries et al. 2003). Those analyses form a joint, broad research trend referring to the issue of urban environmental justice.

Despite the growing research in this area, there is comparatively little evidence demonstrating differential health benefits associated with specific characteristics of green space. Varying configurations of green space, built environment and topographical features near a person's residence may offer different opportunities for physical activities and mental renewal, depending on the person's age, gender and individual preferences (Wheeler et al. 2015). An urban green space may have varying qualities that offer different opportunities for relaxation, engagement with the natural environment, physical exercise and athletic activities or getting away from unpleasant aspects of the urban environment, such as noise or heat.

Douglas et al. (2017) review the evidence linking health, well-being and green space using a life course approach that gives the guidance for the provision of more inclusive green spaces which respond to the varying needs of people across all life-course stages. According to their research the childhood interactions with and within green spaces are beneficial for the health of children both physical and psychological, as well as for their social ad intellectual development. The design of parks which promote physical and social well-being in teenagers emerges as a potentially key focus in promoting life-long physical and psychological health and well-being through childhood, adulthood and old age. Planning and urban design can facilitate green space activity and recreation among older people by providing accessible and safe green spaces with well-maintained walking infrastructure, that is safe and wheelchair accessible. Such provision can encourage older people to observe, use and benefit from public green space for as long as their health condition allows.

Urban natural spaces provide a wide range of benefits, or ecosystem services, that support physical, psychological, and social health. In many cases, however, these benefits are not equitably distributed across diverse urban populations.

3 The Shortage of Researches on Urban Greenery and Health in Poland

Most of the studies on the nature-human relations and urban ecosystem services have been conducted in Western European countries and North America (Haase et al. 2014). Some findings, such as the stress reduction opportunities that urban green space affords, have been replicated in multiple studies conducted in different countries. However, most of the epidemiological studies have been carried out in high income countries (mainly in western and northern Europe, as well as in North America, Australia and Japan).

There is broad literature on the significance of nature for inhabitants' health and quality of life but most of the researches were realised in high developed countries and regarded epidemiological health measures based on statistical health data. Although some researches have shown that public parks and green space provide a variety of physical, psychological, and social benefits to urban residents, few studies have examined the influence of parks on comprehensive measures of subjective well-being at the city level (Larson et al. 2016). Moreover, very little is known about the (additional) positive effects of green space on wellbeing through mechanisms of increased and prolonged physical activity, and improved social cohesion (Maas et al. 2006). Some evidence suggests that exposure to local green space confers a health benefit on more general level (for example country or group of countries) but this association is not observed at the city level. Further work is needed to establish how urban residents interact with 'local' green space, in order to ascertain the most relevant measures of green space for improving their quality of life and well-being (Bixby et al. 2015).

World Health Organisation emphasizes the need for more research on urban green space and health in the eastern parts of Europe. Such research is essential for assessing health benefits of urban green spaces in middle and low income countries and in cities with different urban design characteristics (World Health Organisation, 2016). Poland, similarly to other Central and East European countries, has not been the area of such studies on the role of urban natural areas for city residents' health and well-being. Particularly the literature on the governance of urban ecosystem services has been clearly biased towards some regions, and while Western Europe has been well represented, the post-transition countries remain almost a blank spot (Kronenberg 2015).

Choices and preferences of people, built in stable, old western democratic countries cannot be directly transferred to a post-communist country—as for example was demonstrated in consumer choices with price, and not quality, being the main factor in shopping (Degeratu et al. 1999). Similar contradiction relates to health which as a declared value has high position in the hierarchy of values, but in practice healthy lifestyle and preventive health care is rarely implemented in Polish society (Bogusz 2004).

Polish economic and social situation differs from Western European countries. Changes in Poland as a result of political transformation in the 1980s are more rapid

than average, but there is still no clear established middle class in the social structure. Moreover, the characteristic feature of Polish social hierarchy is little mobility measured by changes in the position and status in subsequent generations. This means that inequalities reproduce themselves, and certain groups remain privileged, as for example with access to education. Despite the "revolutionary" political and economic changes and political elite transition after 1989, at a deeper level of social structure still the same mechanisms exist as in the final period of the Polish People's Republic (Domański 2009). This factor may be crucial while examining peoples' value perception, choices and preferences taking Polish social structure into consideration.

Another significant difference between West and East is the level of urbanization in Poland which is clearly lower (60%) than in Western Europe (80%). However, as a result of rapid political and economic changes which happened after 1989, many big cities transformed their composition due to massive housing or other infrastructure constructions, interfering with natural environment within cities. As a result, natural spaces were very often modified and lost their primary functions.

Although during the economic and social transition period in Poland several environmental indicators in cities have improved (e.g. emissions of pollutants from industry; share of treated waste water), other problems have emerged or intensified (e.g. increased generation of waste and traffic) (Kronenberg and Bergier 2012). The increased wealth and new socio-cultural patterns have led to further urbanization, growth of urban populations, and urban sprawl. Meanwhile, the urban structure in city centers in many cities has been worsening (degradation of old buildings and urban greenery, increasing areas covered by roads and car parks). As a result, pressure on urban ecosystems has been increasing both within city centers and in the greater city areas, resulting in shrinking green areas and increasing areas covered with paved surfaces (Kabisch, Haase 2013).

Paradoxically, greenery was frequent in socialist cities, and it only started to shrink rapidly with the economic transition. The neoliberal economic system entailed the extensive privatization of land and the allocation of public space for private uses, lifting the relatively strict socialist-era building regulations, and limiting investment in public goods, instead favouring what the market demanded (i.e. in the interest of the wealthier spheres of society) (Hirt 2013). The role of the public sector was minimized, but it was still expected to manage public space with the limited funds available for these purposes.

The use of resources for present purposes may endanger future resilience of cities what we can observe even in high developed countries like Japan. Green spaces in Tokyo provided in the past a flexible, but gradually disappearing resource. The adaptive capacity secured by the green space resources is currently no longer available in the capital city. The Tokyo case underscores the risk inherent in the reduction of non-renewable resources to accommodate economic growth and short-term resilience at the expense of long-term resilience (Kumagai et al. 2014).

Lack of awareness of the significance of urban green infrastructure more generally, is definitely an important problem that affects proper management of urban ecosystem services. It is reflected in many institutional failures that collectively

explain resistance, or at least apathy, to urban greening. However, these institutional failures are also related to other important problems, such as institutions being locked in historical trends favouring other interests over the protection of green areas. The poor quality of institutions has been one of the most important barriers to sustainability in Poland and in other transition and post-socialist countries (Kronenberg and Bergier 2012), where the sudden collapse of the previous political system and the subsequent focus on economic transition, the free market and consumption left little space for other issues.

Meanwhile, the public sector in post-socialist countries was (and still is) affected by many institutional problems, especially when compared with the situation of its counterpart in Western countries. The common problems include lack of supplies of green areas (which makes planning and management difficult), low level of innovativeness in terms of acquiring funds for urban forest management, ad hoc management activities (not part of a comprehensive and strategic approach to the management of green areas), poor communication between different departments, and poor public participation processes (Gudurić et al. 2011). These issues have also been confirmed in Poland.

Structural problems result in limited opportunities for investment in environmental protection. Disproportionately more attention has been paid to basic economic concerns than to environmental objectives, including many solutions that favoured investment in public goods. These problems translate into a lack of creativity for problem solving in the public sphere and over trust on the existing institutional structures, as opposed to openness to new ideas or institutional reform. They illustrate the difficulties in getting local authorities responsible for urban greenery to adopt new management solutions, as they are confronted by the 'other priorities' and the conviction that there is no space for greenery in modern city centers.

The main need to research in Poland is to identify and define the role of urban natural areas (land and water) for health and subjective well-being of urban residents, in the context of changing social structure after economic transformation. The research should verify whether the availability of natural areas in the city is a limited luxury only to a privileged part of the society or of vital importance for the city dwellers, that is necessarily to maintain a high quality of life and self-assessment of health by residents, regardless the city social structure. The modifying role of the social structure on the perception of health and well-being of citizens and assigning the value to natural areas in the city has not been widely studied in Poland, and the results of similar studies conducted in other countries are ambiguous.

Considering the complexity of main research problem we can formulate a number of specific research questions that examine the general people attitude toward natural resources and areas within city, their opinions on values given to nature, perception on the accessibility, quantity and quality of spaces for recreation and spending leisure time, and general pattern of health behaviors (sport, recreation):

- What are the social and environmental determinants of subjective well-being of city dwellers?
- How and to what extent differences in the social structure of urban population affect the perception and usage of natural spaces?
- To what extent the quality, quantity and availability of natural resources determine health behaviors (physical activity, recreation and leisure activities) of residents?
- How are green spaces distributed and utilized across different communities?

Those general issues allow to formulate more specific and detailed questions on the role of nature for subjective well-being and find out the mechanism of taking physical activities within natural areas in urban environment depending on place within social structure:

- How are cultural ecosystem services perceived and valued among different populations at both the community and household scale?
- What characteristics of urban green space maximize the delivery of cultural services which support social determinants of health?
- Does a direct access to more natural urban areas have an influence on residents' decisions on the place of dwelling?
- Through which pathways can natural spaces precipitate specific health outcomes?
- Are there strong traditional bonds to some forms of nature use?
- How those aspects correspond with the self-assessment of health?
- To what extent the amount and quality of green and blue areas can be employed as a key explanatory factor in relation to subjective well-being?

Recognizing urban residents' perception on the value of natural areas and their behaviors has both cognitive and practical aspect. In the cognitive sense it will be interesting to examine the attitudes and values attributed by city residents to health, their health behaviors (recreation, sport, leisure time etc.), and the usage of natural areas. In practical sense it is important to find out to what extent natural urban areas influence residents' subjective well-being and their quality of life.

4 Conclusion

This paper has presented an overview of the role of urban natural spaces for city residents and discussed the shortage of similar studies in post-transitional countries in Central and Eastern Europe, on the example of Poland. The aim was to take a look at the ways on how urban green spaces can be planned and managed in ways that are more meaningful to different people and groups.

Urban planners, managers and policy-makers face conflicting demands to promote more compact cities with greater population density in order to create critical mass to support and justify public and private service provision. This also applies to

provision of green space and improvement of urban ecosystem services. The current studies show that urban green space has health benefits, particularly for economically deprived groups, children, pregnant women and senior citizens. It is therefore essential that all communities have adequate access to green space, with particular priority placed on provision for disadvantaged groups. While details of urban green space design and management have to be sensitive to local conditions, the need for green space and its value for health and well-being is universal. A city of well-connected, attractive green spaces that offer safe opportunities for urban residents for active mobility and sports as well as for stress recovery, recreation and social contact, is likely to be more resilient to extreme environmental events, such as heat or extreme rainfall. Such a city is also likely to have healthier citizens, reducing demands on health services and contributing to a stronger economy.

Urban growth, by changing cities and the surrounding countryside, presents numerous challenges for the maintenance of urban green space, and consequently also for human health and well-being. In this regard, the studies on Polish specifics can contribute to better understand the mechanisms that lead to positive outcomes for people of different socio-economic statuses, and thereby assist urban planners and decision makers in designing more successful strategies for socially, economically and environmentally sustainable settings. At the same time, it would be important to include residents in the planning process and consider their needs and expectations, as they are the final users of these settings. Conducting researches on the relation between urban natural setting and city dwellers in Poland can allow to use limited and declining urban natural areas more efficiently and adapt them to various needs of their residents. In the long-term perspective it may improve health and subjective well-being of city inhabitants, and as a result increase their quality of life.

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