Climate Change Education and Outreach
in the Eastern Mediterranean and Middle East

Report of the Task Force
on Climate Change,
Education and Outreach
of the Climate Change Initiative
in the EMME Region

Regional Climate
Change Initiative
Republic of
Cyprus

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SPORT
AND YOUTH

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This publication is based on work of Task Force group for Climate Change Education and Outreach of the Cyprus Regional Initiative of the Climate Change in the Eastern Mediterranean and Middle East countries (EMEE). The authors of the report on Climate Change Education and Outreach are responsible for the choice and presentation of the facts contained in this publication and the ideas and opinions expressed in this publication do not commit the Cyprus Institute which leads the process on behalf of the Republic of Cyprus.

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Abbreviations

ACCCP	**Arab Centre for Climate Change Policies**
ACRI	**Arab Climate Resilience Initiative**
AFED	**Arab Forum for Environment and Development**
APCM	**Arab Permanent Committee on Meteorology**
ARCA	**Alexandria Research Center for Adaptation to Climate Change**
CBL	**Community-Based Learning**
CCI	**Climate Change Initiative**
CCE	**Climate Change Education**
COP	**Meeting of the Contracting Parties to the Barcelona Convention and its Protocols**
EMME	**Eastern Mediterranean and Middle East**
ENI	**European Neighbourhood Instrument**
ESD	**Education for Sustainable Development**
EU	**European Union**
GCC	**Gulf Cooperation Council**
GCEP	**General Corporation for the Environment Protection**
GHG	**Greenhouse Gases**
GIZ	**German Agency for International Cooperation**
GLOBE	**International Global Learning and Observations for Benefit of the Environment**
HEI	**Higher Education Institutions**
IAEA	**International Atomic Energy Agency**
ILO	**International Labour Organization**
IT	**Information Technology**
KAP	**Knowledge, Attitudes, and Practices**
KFAS	**Kuwait Foundation for the Advancement of Sciences**
LAS	**League of Arab States**
MAB	**Man and the Biosphere**
MCESD	**Mediterranean Committee for ESD**

MEdIES	**Mediterranean Educational Initiative for Environment and Sustainability**
MERA	**Ministry of Education and Religious Affairs, Greece**
MoARDE	**Ministry of Agriculture, Rural Development and the Environment, Cyprus**
MoEC	**Ministry of Education and Culture**
MOEHE	**Ministry of Education and Higher Education**
MoU	**Memorandum of Understanding**
MSESD	**Mediterranean Strategy on Education for Sustainable Development**
NES	**National Environment Strategy**
NGO	**Non-Governmental Organisations**
PCHEI	**Partner Country Higher Education Institutions**
PRIMA	**Partnership on Research and Innovation in the Mediterranean Area**
PV	**Solar Photovoltaic**
QE	**Quality Education**
QRTA	**Queen Rania Teacher Academy**

RCE	Regional Centres of Expertise
SDG	Sustainable Development Goals
SDSN	Sustainable Development Solutions Network
TVET	Technical and Vocational Education and Training
UAE	United Arab Emirates
UfM	Union for the Mediterranean
UNDESD	United Nations Decade of Education for Sustainable Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme's Mediterranean Action Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
WMO	World Meteorological Organization

Abstract

The Eastern Mediterranean and Middle East (EMME) region is a hot-spot of climate change. The urgently needed implementation of mitigation and adaptation measures to address climate change cannot be effective without wide public understanding and support, particularly by the young. Education and public awareness on climate change, conventionally termed "climate change education" (CCE), reaching not only school children but the society at large, is of utmost importance for securing the enabling environment for informing, convincing and involving key policy makers and leaders – while mobilising all stakeholders for the needed transformation.

The aim of this work is to identify the trends, commonalities and gaps of CCE in the EMME region and to help the countries of the region to develop synergies and collaborate to accelerate and integrate CCE into their educational policies and systems.

Data collected from all countries and relevant stakeholders indicate that progress has been made throughout the region on linking education with the SDGs related to climate change in primary and secondary schools. In that progress, however, knowledge and natural science aspects have prevailed over critical thinking and problem-solving elements.

In higher education a similarly strengthened focus on climate change is evident in under- and post-graduate courses, followed by relatively high international rankings on SDG 13/Climate Change.

Despite progress on training teachers for CCE, gaps persist both in pre- and in-service teacher education, significant gaps were identified in professional development opportunities.

Similarly, in vocational education and training, CCE needs to be further developed to match the rapidly emerging opportunities for green jobs. The goals must be to assure the high-quality skills and knowledge required to support technological and other applications needed to address climate change.

Many non-formal and informal educational interventions have been undertaken, mostly by non-state actors supported by national and or regional/international sources. However, the need for outreach to the general public and its mobilisation are enormous, demanding special skills for presenting complex natural phenomena and for balancing the sense of urgency with the empowerment brought by a positive spirit of ownership, solidarity and hope for improvement.

Governments, regional organisations and non-governmental and academic organisations have developed valuable teaching tools, including manuals, guides, handbooks and videos on education for sustainable development (ESD) and CCE. The major obstacle in using this material is the language mix in the region and scant access to electronic media. Many educators are not fluent in English or French – the languages in which most of this material is produced – while they also lack information technology skills.

Research in CCE, and more generally in ESD, follows two major directions: The first, purely educational, is based on pedagogies, methodologies, and other approaches that enhance the effectiveness of educational interventions. The second, based primarily on natural science, is related to climate change and its impacts, complemented by analyses in which socio-ecological and cultural dimensions come into play.

These are useful for supporting the educational content. Both directions are ideal fields for regional cooperation. Furthermore, the present work emphasises that despite the region's political difficulties, all EMME countries seem keen to identify

the best modes of co-operation and effective synergies to address the common challenge of climate change.

The last part of the present work suggests the adoption of a vision according to which strong collaboration in CCE could contribute to converting EMME, a turbulent and vulnerable world region, into a pioneering one for ESD and CCE. This vision could be used to stimulate young people, academics and other vital stakeholders as the region moves towards a more secure future.

For the next steps ahead, some strategic orientations and options for the facilitation and operationalization of the initiative are proposed.

"The urgently needed implementation of mitigation and adaptation measures to address climate change cannot be effective without wide public understanding and support, particularly by the young"

Executive Summary

In the massive global effort to address climate change, leaders have identified education and outreach as some of the most powerful tools available to organisations and governments. Education on climate change reaches a vast array of people, from those who understand climate change and its global impacts, to those who don't understand the phenomenon and yet are affected by it. Education reaches people who see climate change as a major threat and are accordingly prepared for action on mitigation and adaptation. Education also reaches the sceptical, who are accordingly indifferent to any action at all.

Action on climate change requires scientific advances, social inclusion and a strong understanding of the challenges posed by, and potential responses to, climate change. The range of potential responses can be achieved only through the transformative approaches inherent in education itself. Conventionally termed "climate change education" (CCE), these educational approaches should be understood as integral to Education for Sustainable Development (ESD), which is focused on learning, instruction and experiences that relate complex climate phenomena beyond emissions of greenhouse gases. They also develop effective responses to climate change that include both mitigation and adaptation.

Advancing CCE and its goals requires a deeper dive on the existing efforts and policies towards ESD. The effort requires understanding what further work must be done, within the concepts and structures of ESD, to highlight and emphasise climate change in a way that builds on present initiatives, while developing needed new approaches to this huge challenge. To truly mobilise positive change in the Eastern Mediterranean and Middle East (EMME) region, one of the hotspots of climate change, CCE will have to engage its audience at the right political levels – informing, convincing and involving key policy makers and leaders – while mobilising all stakeholders in the EMME region for action.

The aim of this work on education and outreach is to help countries in the EMME region determine how best to collaborate to face climate change, and to assist them as they integrate CCE into their educational policies in schools, universities and beyond. The report is based on an analysis of diverse resources, among them formal country and regional reports, research papers, policies and surveys for CCE provided by the respective ministries and agencies (national and regional), in addition to organisations and institutions. Resources on non-formal and informal initiatives have emerged from ESD efforts across the EMME region, Millennium Development Goals, Sustainable Development Goals (SDGs) as well as relevant documents on CCE and sustainable development activities. The sections below take up issues of CCE in primary and secondary schools, in higher education, in non-formal and informal education, in professional development and vocational education as well as in educational research and regional co-operation on CCE.

The report has unavoidable limitations stemming from diverse and varying terms of art; constraints around data; classification and content issues; and multiplicity of means, tools and frameworks of action. It nevertheless constitutes the first time that the region has considered climate change in education on such a large scale. The EMME region is probably among the first non-UN geographical regions to do so until now. The work identifies the trends, commonalities and gaps of CCE in the EMME region and seeks to cover, to the extent possible, key areas that can be integrated into education on climate change.

The report finds diverse challenges for CCE, differing by educational form and level.

CCE in primary and secondary schools: Instruction in CCE could place more emphasis on the societal and cultural elements inherent in climate change. This despite the pro-

gress made throughout the region on linking education with the SDGs and focusing on more interactive and student-centred instruction. Additionally, a gap is noted on the critical thinking and problem-solving elements of CCE compared with the prevailing knowledge-based approaches in teaching what climate change is. There is also a need to address climate change in more direct and explicit ways than those used in the generic instruction used for ESD and other sustainability topics. Teachers would benefit from preparation and training on climate change and its impacts and on new and innovative teaching methods.

CCE in higher education: CCE in colleges and universities has a similarly strengthened focus on climate change, albeit with different approaches and initiatives. Since rankings were first established in 2019, universities in the region have tripled their standings, and many have maintained high levels of global competition vis-à-vis SDG 13.

Despite progress on training teachers for CCE in institutions of higher education, gaps persist mostly in pre- and in-service teacher education at the undergraduate and post-graduate levels. The entire region needs more programmes to train teachers in ESD and CCE. Teacher training on climate change are mostly post-graduate offerings. Certain undergraduate curricula integrate climate change elements, topics and lectures, and some undergraduate programmes take on climate change as a field of instruction. But programmes focusing, for example, on medicine, business, arts, sociology – fields that don't strictly pertain to the natural sciences or engineering – have obvious pedagogical gaps in climate change and sustainable development.

CCE in professional development: The main challenges pertain to weaknesses in the professional development structures mandated to support teachers. On the one hand, in the EMME region a range of initiatives have been developed to train teachers on ESD and CCE, mostly in-service. On the other hand, the scarcity (or total lack, in some countries) of professional education programmes dedicated to ESD and CCE stand in the way of integrating these proficiencies into teachers' professional development. Another gap stems from behaviour seen among some trainees/educators who appear unconcerned and inattentive on CCE. Surveys indicate that teachers do not see how such training advances their careers or secures better economic returns, etc. Some teachers expressed that they had much higher expectations for the training than what the given systems could offer.

CCE in vocational education and training: Training in these contexts can be addressed in the EMME region in multiple ways. The first option is by integrating CCE and ESD into the curricula of technical and vocational education and training (TVET) institutions. Yet other options take a more advanced view, linking TVET with green careers and jobs created because of climate change. A rapidly developing green jobs market requires matching demand with supply while assuring that high-quality skills and knowledge will support applications under real country conditions while preparing carefully for the future.

CCE in non-formal and informal educational settings: A variety of non-formal and informal educational interventions have produced very positive results throughout the region. Undertaken chiefly by non-state actors, these interventions are frequently supported by national and or regional/international sources. Given the relatively limited means and vast audience to be reached, it remains difficult to identify the most effective outreach for the general public. Climate change involves highly complex phenomena that are not easily and sufficiently covered through traditional awareness raising campaigns seen so often in informal education. Another difficulty with this educational outreach is to balance a sense of urgency with the empowerment brought by a posi-

tive spirit of ownership, hope for improvement, solidarity and social mobilisation.

Teaching materials and CCE: Governments, regional organisations and non-governmental organisations in the EMME region have developed valuable teaching tools - manuals, guides, handbooks and other materials on ESD and CCE – in formal, non-formal and informal educational settings. Some of these materials appear to lack, however, an interdisciplinary approach that is specific, balanced, conclusive and comprehensive. The major obstacle in using this material comes from the language mix of the region, as many educators lack fluency in English and French, the languages in which most of the internationally available material is produced. Furthermore, because many educators and students still have scant access to electronic media there is a concomitant need for pre- and in-service training, digital capitalisation and familiarisation with foreign languages (see permits, copyrights, etc.), transactions in Mediterranean languages (Arabic in particular) and materials available in other languages (mainly English and French).

Research in CCE and more generally on ESD: There are two approaches to generating more research on CCE and ESD, independent in their theoretical and scientific milieus. The first is purely educational, based on pedagogies, methodologies for inspiring and influencing behavioural changes and attitudes towards a better environment and a safer world. The second is based on science, mostly natural science, complemented by analyses where socio-ecological and cultural dimensions come into play. The global challenges relate to the substance of climate change as a phenomenon. To strengthen research in CCE, more cross-sectoral and interdepartmental collaboration is needed to promote problem solving and link research results to policy making.

CCE and regional co-operation: It is noted that despite the region's political difficulties, all EMME countries have expressed genuine interest in identifying the best modes of co-operation and the most effective synergies regarding the common-for-all challenge of climate change. There are three levels of potential co-operation: (1) among the ministries of the EMME countries, (2) informal education and outreach through the governmental networks of environmental education centres and (3) facilitated regional interaction on CCE among non-governmental organisations, civil society organisations and academic institutions.

Possible strategic orientations for CCE and outreach in the EMME region

The value of the analyses below resides not in the policy recommendations but in understanding, first, the prevailing conditions and needs at the regional EMME level, and second, on how the CCE policy landscape is formulated.

The first strategic orientation concerns the autonomy of the CCE task force in relation to the Cyprus Climate Initiative. Two options are proposed. Option 1: The CCE initiative necessarily follows the progress of the Regional Climate Initiative and whatever general provisions might be agreed therein. Option 2: The EMME countries agree that the CCE initiative may move somewhat independent of – or even faster than or in an operationally differentiated, lighter and more flexible manner than – other more political, technical or expensive components of the Climate Change Initiative.

The second strategic orientation concerns the process for elaborating a common roadmap. The roadmap needs to be clearly understood and easily followed for everyone, without creating a needlessly burdensome or costly bureaucracy; safeguarding, in parallel, transparency, fair play and accountability; and avoiding at any cost pitfalls and

obstacles that often pertain to misunderstandings or power games that often attend such initiatives.

For this orientation, there could be three options for beginning to move forward:

Identify the gaps to be prioritised, followed by elaborating national-level recommendations to overcome them and encouraging regional collaboration that would eventually gain support through joint efforts.

Agree on a vision that states the EMME region's ambition to convert a turbulent and vulnerable world region into a pioneering region for ESD and CCE. This vision would be used to stimulate the youth, academics, other vital stakeholders as the region moves towards a more secure future.

Settle on a facilitating structure able to co-ordinate action to promote CCE and mobilise the necessary involvement of countries and other stakeholders and eventually finance programmes, projects and joint activities.

It is vitally important that the recommendations and strategic orientations for CCE in the region gain the support and confidence of all EMME countries as well as the region's CCE community. To ensure success, the CCE task force has proposed three operational steps:

1. The CCE initiative for the EMME region fully benefits from the overall efforts of the entire Regional Climate Initiative but maintains operational autonomy that secures optimal conditions for a sustainable initiative under and circumstances.

2. A CCE/ESD committee or task force established with representation from all the EMME countries and eventually several associated regional bodies having the status of observers or few organisations with advisory roles (e.g. the Mediterranean Commission for Education for Sustainable Development). The committee could appoint a provisional presidium and be supported for an initial period by a small provisional secretariat.

3. A "declaration" or "charter" or memorandum of understanding (i.e. a strategic document) could be proposed. It should state a concise vision for the scope, ambitions and general action plan for CCE in the EMME region, offering broad guidance for CCE development at the country and regional levels.

"In the massive global effort to address climate change, leaders have identified education and outreach as some of the most powerful tools"

Scope of Climate Change Education within the Climate Change Initiative | 1

Climate change is one of the severest challenges facing the Eastern Mediterranean and Middle East (EMME) region[1]. As such, it requires a consistent, co-ordinated regional response. Relevant education is urgently needed so young people, and society as a whole, are prepared to address climate change. Conventionally termed "climate change education" (CCE), such education should from the outset be considered integral to Education for Sustainable Development (ESD), and focus on learning, teaching and experiences that convey the complex phenomena of climate change beyond emissions of greenhouse gases (GHGs), and develop effective mitigation and adaptation actions in response.

Global and regional fora and projects have concluded that despite notable achievements across various fronts (lowering emissions, establishing adaptation strategies and ad hoc awareness raising), more is needed. Investments in educating youth as well as society not only about the dangers, risks and impacts of climate change but also regarding the various ways in which climate change can be addressed, including holistic approaches, are needed.

The present initiative aims to facilitate the development and promotion of CCE in the EMME region. Specifically, this work focuses on how the subject of climate change is dealt with in the region across educational levels – in formal, non-formal and informal settings extending across age ranges from early childhood to post-graduate studies and lifelong learning. Also covered are approaches that pertain to capacity building, training and awareness-raising campaigns. The work also aims to identify shortcomings in the relevant policies and strategies of the EMME countries and in so doing provide a basis for guidelines and recommendations that incorporate climate change prominently within the educational system, acknowledging that education is a key driver to empower and motivate not only youth but also civil society to take part in climate change actions that effectively address root causes, to the extent feasible.

For the purposes of this report, CCE is defined as broadly as possible. In this way, most climate change topics across all educational settings in the region can be considered and included. To this end, challenges and gaps are identified (and discussed) in each section; the text is then supplemented with proposals and recommendations.

Please note that when specific country examples are used to demonstrate conditions and cases requiring attention, the report will not comment on a particular policy's quality. It will remain focused on how CCE across the region is supported through policies and in what ways CCE may have been neglected.

Based on the above, the report provides proposals for promoting CCE at the national levels in addition to co-ordinated action taken multilaterally within the EMME region.

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[1]. On the term "region" see definition in the next chapter

The Geopolitical Setting of the Eastern Mediterranean and Middle East Region

2

This section will provide a brief introduction to the geography, climate, culture and politics of the EMME region, as these influence the issues around CCE. It will also highlight some interesting commonalities among the various countries of the region. The term "region" in this text, is used to broadly describe a specific geographic area. Clearly, it does not correspond to any UN region or a single "ecoregion".

2.1. Geographical and environmental setting

The geopolitical setting of the region (see Figure 1) encompasses 17 countries that occupy three different continents and feature various political and cultural groupings (below in alphabetical order):

Arabian Peninsula: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates

Europe/European Union: Cyprus, Greece

Middle East: Israel, Jordan, Lebanon, Palestine, the Syrian Arab Republic, Turkey

North Africa: Egypt

Western Asia: The Islamic Republic of Iran, Iraq

Many of them face grave environmental problems that are seriously exacerbated by climate change. Most of them face water scarcity. Desertification and soil erosion are serious issues throughout the region, conditions that are aggravated by frequent, large-scale forest fires, followed by floods and loss of biodiversity. Environmental management, which extends to solid waste and wastewater, remains a serious challenge.

Because CCE falls under national education policies that reflect specific country priorities, resources, interests and cultures, we should recall that a number of EMME countries

base their economies on fossil fuel extraction and export (Balat, 2006). Others are exploring or exploiting important new offshore hydrocarbon deposits, while all the EMME countries are rich in renewable energy sources, solar energy in particular (Ciriminna et al., 2019).

Revisiting and upgrading climate change policies are at the heart of the Cyprus Climate Initiative. Society's appropriate awareness, and in particular among the youth, is a prerequisite for effective preparation and implementation of climate change and energy transition policies at all levels. Promoting CCE, in general, is a prerequisite for the needed new policies. Therefore, CCE is a priority requiring support and, if possible, advancement in all countries of the region, preferably through multilateral regional co-operation.

The 17 countries of the EMME share important geomorphologies – coastlines, for example. They each have marine borders (Mediterranean, Black and Red seas; Persian Gulf; Gulf of Oman; Indian Ocean). Their marine geomorphologies intensify the climate change risks posed by rising sea levels, ocean acidification and related climate challenges (Cramer et al., 2018). In addition, many of them are among the most-water-scarce areas in the world, rendering the management of water resources even more difficult and putting coastal wetlands under tremendous pressure (Cramer et al., 2018). Eight of the EMME countries have Mediterranean coastlines. They are accordingly all parties to the Barcelona Convention for the Protection of the Mediterranean Sea and of the Mediterranean Commission of Sustainable Development, facilitated by the United Nations Environment Programme's Mediterranean Action Plan (UNEP/MAP).

The region hosts some of the world's most important shipping routes (Suez Canal, Gulf of Aqaba, Persian Gulf, Bosporus Strait) as well as some of its largest ports (UNCTAD, 2019).

FIGURE 1

Countries Included in the Climate Change Initiative
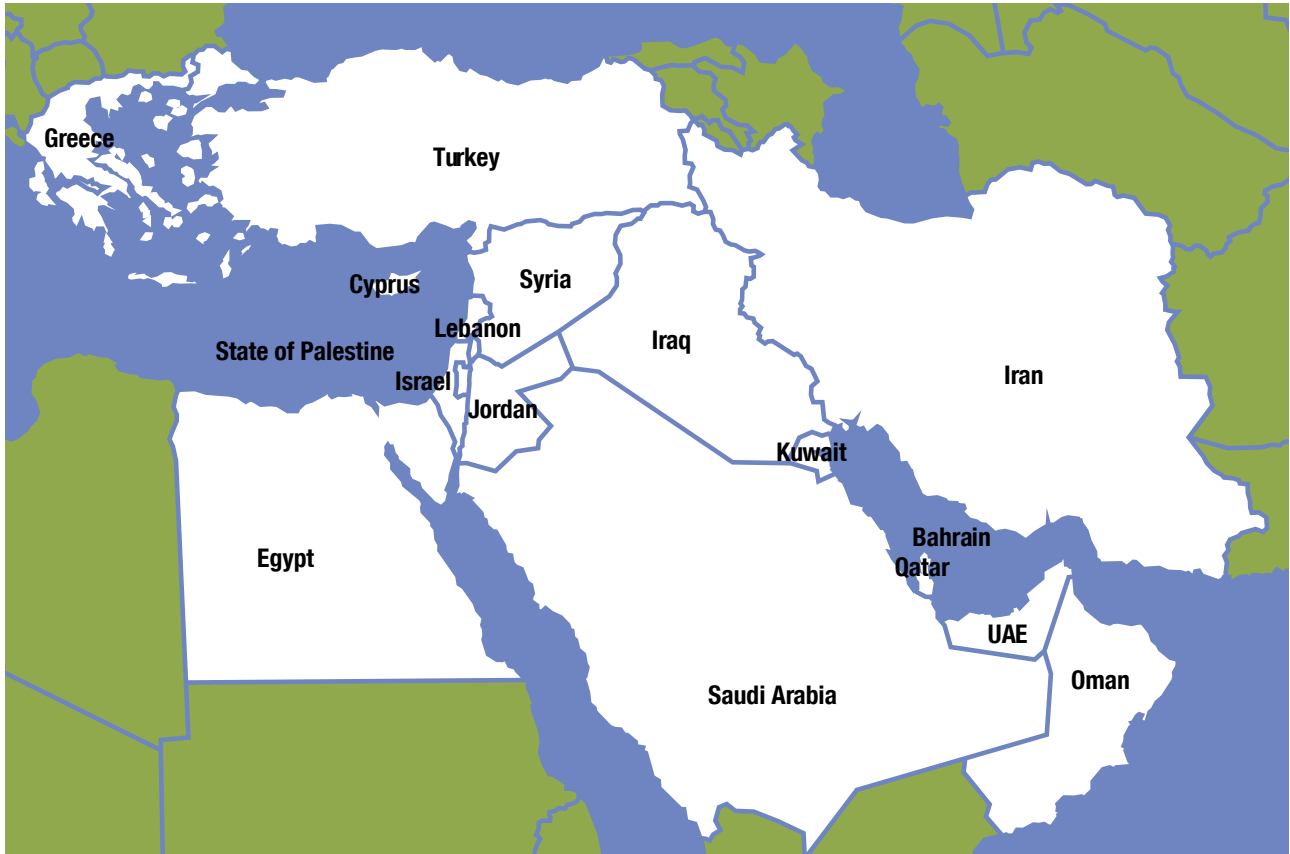
"CCE is a priority requiring support and, if possible, advancement in all countries of the region, preferably through multilateral regional co-operation."

2.2. Political and cultural setting

The countries that have signed on to the EMME Climate Change Initiative have varying cultural, religious, political, social, economic, historic and philosophical backgrounds. Their domestic circumstances and administrative structures are likewise diverse, along with their rates of population growth and the sizes of their gross domestic product. Countries of the region, with their rich and ancient histories, also constitute one of the most turbulent geographical areas in the world, with instability in many vital sectors, instability largely influenced by major outside powers.

The political/institutional systems of the EMME countries, which vary considerably, include:

Presidential, semi-presidential and parliamentary democracies/republics (Cyprus, Egypt, Greece, Iran, Iraq, Israel, Lebanon, Palestine, Syria, Turkey and the United Arab Emirates)

Kingdoms (Bahrain, Jordan, Saudi Arabia), sultanates (Oman) and emirates (Kuwait and Qatar)

All the countries are represented in various intragovernmental organisations, including the UN bodies (such as the United Nations Educational, Scientific and Cultural Organization [UNESCO], the United Nations Economic Commission for Europe [UNECE], the United Nations Environment Programme – [UNEP], the League of Arab States [LAS], the European Union [EU], the Organisation of Islamic Cooperation [OIC], among others. Furthermore, the Mediterranean countries plus Jordan are members of the Union for the Mediterranean [UfM], which brings together all the EU countries with those of the Mediterranean. Tensions and conflicts are notable among countries of the region; however, many of them have shared cultures, religions and languages for centuries. Arabic is spoken in 12 of the 17: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria and the United Arab Emirates. Greek and Turkish are spoken in two countries each, since Cyprus has both these languages as official ones, affiliating the country linguistically, with both Greece and Turkey. Iran and Israel have their own languages. The three major monotheistic religions of the world, those "of the Book", originated in the EMME region.

Another feature the EMME countries share, notable for this initiative, is a susceptibility to climate change that threatens the entire region. This shared major threat may help them overcome some of their differences and encourage them to co-operate more closely. As these dangers do not respect national borders, it is imperative that they be considered urgently and wisely, and in synergy.

Regarding education and culture (particularly ESD), all the countries participate in the UNESCO. All the Mediterranean countries, including Jordan – as well as international bodies like UNESCO, UNEP, UfM, UNECE – participate in the Mediterranean Committee of ESD, currently chaired by Cyprus and facilitated in scientific matters by the UNESCO Chair on Sustainable Development Management and Education in the Mediterranean and administratively, by the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE).

Progress on CCE/ESD in the EMME region, which is an undoubtedly "difficult" neighbourhood, may offer the world a hopeful example on how climate change, this serious global threat common to all, could bring closer together neighbourhoods that otherwise might underestimate or neglect the power and benefits of synergy.

Overview of Climate Change Education in the Eastern Mediterranean and Middle East Countries | 3

3.1. Evolution of key concepts

Climate change has become, over the past several years, one of the foremost challenges facing humankind. While regions and countries have responded slowly to the threat, only gradually recognising its gravity, action elsewhere has been more striking and deliberate. On the global political stage, with the United Nations at the forefront, leaders of different sectors of the society are spearheading policy initiatives to take on the impacts of climate change at every possible level.

Education is one of the greatest tools available in the face of climate change and its impacts. In fact, the final report of the United Nations Decade of Education for Sustainable Development (UNDESD) called education a key tool both for the general public and for decision makers seeking to advance sustainable development and achieve the Sustainable Development Goals (SDGs) – naming SDG 13 (climate change) and SDG 4 (education) in particular (UNESCO, 2014a). Climate-change-related education reaches a vast array of people, from those who understand climate change and its global impacts, to those who may not understand, and yet are affected by, the phenomenon. Education reaches people who see climate change as a major threat and are accordingly prepared for action on mitigation and adaptation. Education also reaches the sceptical, who are accordingly rather indifferent.

As a consequence, education remains a high priority as humankind faces the challenges of the 21st century, including climate change. To this end, UNESCO has committed to act on nine of the SDGs, including SDG 13: Climate Action:

...by supporting countries in making transformative change and ensure that all learners have the skills and knowledge they need to become responsible, green, global citizens; to
advance science, technology and innovation for the development of sustainable solutions to mitigate and adapt to climate change and other global challenges; to expand access to ICTs to promote socio-economic development; and to ensure that culture is integrated into sustainable development strategies, so that they are relevant, effective and adapted to local contexts." (UNESCO, 2017b)

It is therefore vital for our global institutions to support programmes that educate, inform and involve learners of all ages and from all parts of society in tackling climate change. Engaging people in supporting measures to both mitigate the effects of climate change and adapt to it are likewise essential. Addressing climate change requires scientific advancement, social inclusion and a strong understanding both of the challenges posed by and potential solutions to climate change, all of which can be achieved only through a parallel transformative approach to education itself.

Key to the efforts, however, is the growing recognition that, despite efforts, since the mid-1990s traditional education has been unequipped for the complex challenges of the 21st century. Novel educational approaches are needed. These new approaches have been developed and promoted most notably as Education for Sustainable Development (ESD). Over time, ESD has become the basis for transforming education worldwide (Mochizuki and Fadeeva, 2008; Scoullos, 1999). To promote awareness and understanding around critical global challenges, ESD has built and capitalised on a programme of environmental education that draws on an extensive history of engagement and instruction.

Meanwhile, for historical and other reasons, some academic institutions and schools of thought wish to maintain a separate category for environmental education, emphasising specific aspects of ESD as an "alternative" view or body of learn-

ing. Other institutions have substituted their own coinages – such as Global Citizens Education – for commonplace terms like environmental education and ESD, avoiding mention of "environmental" or "sustainable" development (UNESCO, 2005).

All of these educational approaches nevertheless have similar roots and a common aim: to prepare a new generation to address the excesses of anthropogenic, climate-changing activities, which have now developed beyond the planet's natural boundaries. ESD and its central initiative, CCE, remain vital to the ongoing effort to understand and act on climate change.

The acknowledged need to promote ESD and CCE worldwide is especially relevant to the EMME countries. In recognition of the threats facing the region, two closely related particularly important political documents were adopted – the Mediterranean Strategy on Education for Sustainable Development (MSESD) came first in 2014 (https://medies.net/wp-content/uploads/2019/12/MSESD_brochure.pdf; UfM, 2014), followed by the MSESD Action Plan, in 2016 (https://mio-ecs-de.org/wp-content/uploads/2016/12/ENG_-Action_Plan_accepted_with-post-edits_15-Dec.pdf; UfM, 2016). Their implementation in the region is closely monitored (MIO-ECS-DE, 2017; https://mio-ecsde.org/wp-content/uploads/2018/10/Final_74_soma_lowres.pdf).

As a wide-reaching concept, ESD covers manifold topics in an interdisciplinary fashion. Based on the pillars (or facets) of sustainable development – economy, ecology and society – ESD is implemented and supported by governance and its tools – namely institutions, science and technology – and awareness of cultural and behavioural changes (Scoullos, 2010). Inspired by the above, Figure 2 offers a visualisation of CCE at the centre of the Sustainable Development Education Hexahedron. CCE is directly affected by all the above and is therefore integral to ESD. Because climate change is so

urgent, it needs to be a conspicuous part of curricula and activities. CCE cannot be suppressed as a theme apart from ESD, since ESD examines SDGs in a holistic manner revealing the linkages, connections and systemic nature of climate change. CCE builds on the groundwork laid by previous actors, such as the UNDESD. This foundational work has produced major regional initiatives around the world (including the EMME countries) – initiatives that take up sustainable development in region-specific ways. As a result, dedicated ESD strategies and co-ordinating bodies have sprung up to integrate ESD into their policies, at least at the formal educational levels (UNESCO, 2014a). The implementation of these initiatives has had varying degrees of success.

An ESD focus has addressed several aspects of climate change through formal, non-formal and informal modes of education and in raising awareness throughout civil society. According to a survey conducted by the Pew Research Center, most countries identified climate change as a top global threat. The same survey, however, also found large disparities of opinion within the surveyed countries. For example, in Greece, 90% identified climate change as a top threat, whereas in Israel only 38% said they held this view of extreme threat (Pew Research Center, 2019). Thus, while there have been notable advances in education and awareness raising on climate change and the threat it poses, there is still a long way to go. Apparently, we have not yet reached the required level of consensus in the region on the urgency of climate change and the measures needed to address it.

Advancing CCE requires us to take a deeper look at ESD efforts and policies as they currently stand. Within the concepts and structures of ESD, and of education more broadly, it is important to identify if and what additional work must be done on CCE. Work in general would build on existing initiatives, but specific work would bring novel approaches to bear on this enormous challenge.

FIGURE 2

Visualisation of the Hexahedron of Sustainable Development Education within which CCE is placed
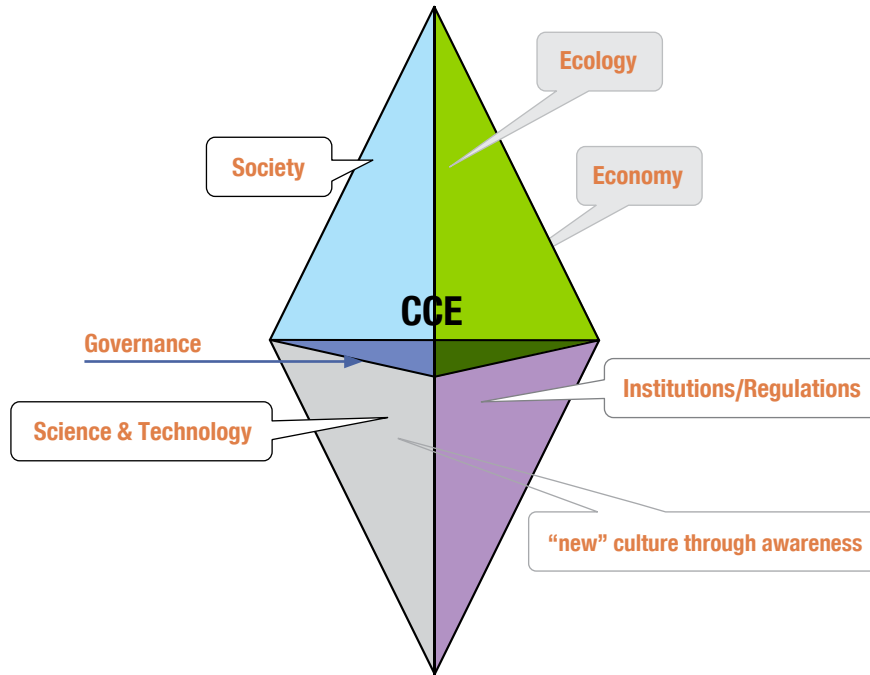
This section attempts to explore the various approaches, policies and measures taken by the EMME countries that either directly or indirectly address CCE in different educational settings.

3.2. The critical importance of political will and the expected impact of climate change education

The final report on the UNDESD observes that "widespread, overt and sustained political support [is] necessary to drive change" (UNESCO, 2014a). The UNECE confirms the importance of political will. From 2005 to 2015 the most important forces spurring the implementation of the UNECE Strategy for Education for Sustainable Development were local and national leaders and politicians across the spectrum (UNECE, 2016). This tells us that in order to advance change in the EMME region, CCE has to be applied at all educational levels but also at the right political levels – informing, convincing and involving key policy makers/leaders on climate change while mobilising all stakeholders to take appropriate, national-level actions throughout the EMME region.

Although a rather trivial statement, it should be made again here: CCE does not only address climate change mitigation, but also adaptation. This is important for everybody to understand since the EMME region is a climate hot-spot (Kim, Seo and Chen, 2019) where climate change is already underway,

and local societies need to learn quickly how to deal with climate change–induced extreme events. Through a more holistic and systematic approach to CCE, all countries of the region can make progress. Not only can they reduce their overall carbon footprint and drastically lower total emissions of GHGs, but they can also help the general public grasp the gravity of the challenges and threats ahead, as well as the most appropriate ways out. What collective and individual plans do we need to work on together; what measures and behavioural changes will forestall, prevent or reduce adverse impacts; how can we adapt to a changing climate and altered natural phenomena induced by climate change, for example, the droughts, forest fires, floods, sea level rise and intrusion of alien species in the Mediterranean. On the latter, the recently introduced by the UN system Ocean Decade and its Ocean Literacy Framework, are expected to provide fertile ground for cooperation with CCE and ESD, focusing on marine issues.

BOX 1

Clarification of terminologies:
Non-formal and informal education vs formal education

Non-formal and informal education may have some similarities, but they refer to two distinct modes, each having different scopes and methods and both of them different from formal education. Formal education is typically structured and guided, involving students, teachers, an institution and a system to certify the direct educational outcome.

Non-formal education is an extension, an "opening" and enrichment, of the schooling system. It allows schools to work outside the classroom, e.g. in a biosphere reserve or a museum closer to the natural environment and "real conditions". It allows parents to participate in school activities or the school to take part in community activities. For example, non-governmental organisations, civil society organisations and other stakeholders typically engage with schools on programmes like beach clean-ups, awareness campaigns and exhibitions. These take place within or outside the educational institution but always in connection to it and under the supervision of the regular educator.

Most countries have strategies and provisions for the implementation of non-formal education, e.g. carefully examining the educational material to be used in schools by those who contribute to such programmes; providing permission for specific organisations that are allowed to "enter" and cooperate with schools; and defining the maximum hours or percentages for such interventions in each academic year or semester.

This is also the most common way to obtain community-based learning (see also Section 6.7). A key difference between non-formal and formal education is that learners who participate in non-formal educational

interventions frequently are not assessed by traditional means (e.g. exams) and are not necessarily certified or credentialed.

Informal education occurs through almost any method, by a multitude of sources without any entity controlling either the message/information/knowledge provided or the educational output. Informal education is almost synonymous with public-awareness campaigns. It broadly implies a more structured presentation of evidence and views, e.g. through viewing and interpreting a documentary or hearing a lecture in a public or private space. Viewing content on TV or online is another mode of providing education and circulating material without offering the possibility of a parallel explanation or answers to questions. Common means include public fora, awareness -raising campaigns, advertisements, public service announcements, TV and radio broadcasts, etc., all of which aim at educating the general public outside the context of learning institutions (such as schools or universities) and without any kind of certification. On a different point, awareness raising, like all communication interventions, should follow both technical and ethical codes, some of which (e.g. for relevant TV programmes) may be monitored by independent commissions or specialised state authorities in some of the EMME countries.

Figure 3 (Scoullos, 2004) provides a useful visualisation of the three types of education.

FIGURE 3

Visualisation of the relationship between formal, non-formal and informal education providers and audiences
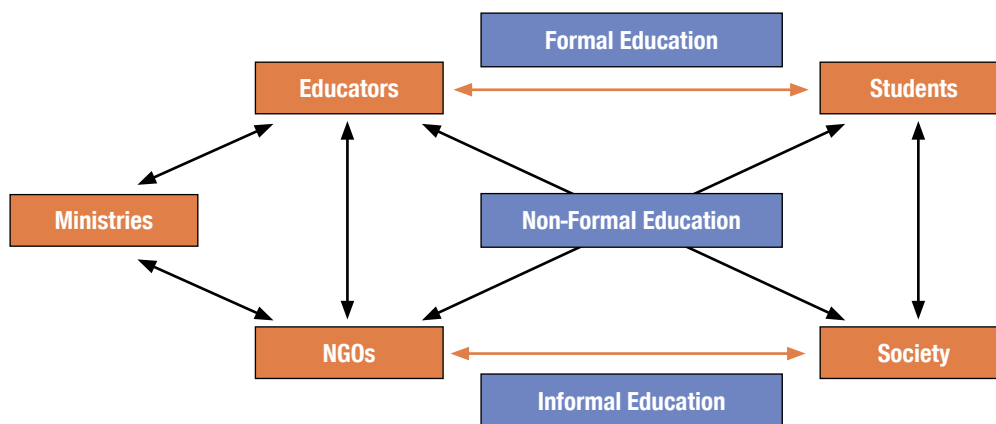
Methodology used in this Report | 4

4.1. The process used to prepare the report

The ultimate aim of this exercise is to prepare guidelines and recommendations for the EMME countries as they turn to their work at the national and, hopefully, regional levels. They have policies and activities to shape as their countries take on the climate change crisis through CCE. Accordingly, the methodology adopted here emphasises collecting and assessing success stories in the EMME countries while, in addition, identifying any implementation gaps and bottlenecks in CCE. Diverse resources were examined, including formal country reports, policies and surveys for CCE that the respective ministries and government agencies pulled together. In addition, we looked at informal initiatives stemming from general approaches towards ESD, Millennium Development Goals, the SDGs and other relevant available sources and documents on CCE, ESD and awareness about climate change and sustainable development.

All national contact points in each of the countries of the region were asked to provide relevant reports, policies, laws and other documents that relate to CCE implementation in their respective countries. The documents provided by the countries were supplemented by international and regional reports, other documents, research papers and articles published in international journals. Several journal databases were used to identify relevant research on CCE. It is evident that the scale of the exercise, compared with the time and resources available, did not allow for an exhaustive review.
The documents were then analysed to identify relevant themes, initiatives and policies. This process was repeated, to the extent allowed by the available material, for each of the EMME countries. As such, the study (and thus the report as a whole) was divided into separate sections according to educational level – primary and secondary education, higher education, non-formal and informal training, professional development and vocational instruction as well as related research. One section is devoted to regional co-operation on CCE.

This analysis reveals regional trends, commonalities and gaps in CCE. Because the aim of the report is regional, conclusions are used primarily to inform potential initiatives for the entire EMME region. Country examples are used, however, to emphasise a lesson learned, delve deeper into a perceived trend or support the analysis and its conclusions.

It is noteworthy that this is the first large-scale report on CCE – at least for this part of the world and probably the only one for a geographical, non-UN region. It seeks to cover, to the extent possible, how key areas of climate change have been integrated into education. Given the broad collaborations that explore CCE as a subset of ESD, it is important to emphasise the specific value of this work. Among its other functions, it provides a useful baseline for assessing future progress. Significant omissions and shortcomings are unavoidable. They stem from the genuine difficulty of locating and obtaining reliable information/resources on CCE across the EMME region's exceedingly diverse educational and sustainable development landscape.

4.2. Limitations of the methodology

The findings of this report are limited by methodological factors, including:

Diversity of terms, even for standardised educational activities. This is particularly true, e.g. for the terms *informal and non-formal education*. These are in fact different types of education, as they are used in the present report (see Box 1).

Extensive diversity in the volume, relevance and format of the information obtained by the members of the Task Force on CCE. The level of response and type of materials provided were extremely diverse, making some elements difficult to compare and correlate.

Scant official, publicly available data: Publicly available documents on CCE were exceedingly difficult to locate, including material on relevant policies, research papers, etc. Despite the research support supplied by members of the task force, many countries covered by the report were remarkable for the dearth of their documents and reports on CCE. Although there may be significant policies, strategies or circulars on CCE, they were not available in literature, nor were they obtainable through the national focal points.

Classification and content issues: Few of the analysed documents mention CCE as a discipline or subdiscipline. In most cases, the documents address CCE elements in a more indirect fashion – either though a general focus on sustainability and ESD or through addressing climate change without referring to education or the concept of CCE. This has made it hard to classify policies and initiatives on the concept or apply an intervention *vis-á-vis* CCE.

Multiplicity of means, tools and frameworks for action: Studying the implementation and promotion of CCE, given the diverse sets of countries employing a range of reporting methods, institutions and languages, impedes efforts to understand the scope, scale and results and impacts of climate change initiatives. The possibility cannot be ignored that many climate change initiatives and policies have been undertaken in informal ways not directed by or reported through specific government entities. This possibility may impinge on the accuracy of the report.

This is undoubtedly the case for the many small or medi-um-size climate change projects, most of them to raise awareness. Carried out by non-governmental organisations (NGOs), civil society organisations (CSOs), local authorities, universities and schools, they were neither named nor specifically included in the report.

"Action on climate change requires scientific advances, social inclusion and a strong understanding of the challenges posed by, and potential responses to, climate change"

Structures, Frameworks and Policies that Help to Promote Climate Change Education in the EMME Countries

5

5.1. Structures: Responsible ministries and agencies

This section focuses on the relevant national authorities and ministries that the EMME countries describe as responsible for integrating climate change primarily in formal education and, to a lesser extent, in non-formal and informal education (discussed separately). Formal education, in this report, refers to formal instruction delivered through approved curricula and taught within formal settings (i.e. technical and vocational schools, educational and training centres, universities, academies, etc.). Formal education is further regulated and supported by laws and norms and organised as a clearly defined system (Feng and Hossain, 2018), where the educational intervention in the learner is tested and certified. This type of education is systematised in a way that *"necessarily involves the teacher, the students and the institution"* (Dib, 1987)

This section also identifies the approaches followed for the integration of climate change in national educational policies, the methods and pedagogical tools for teaching and learning climate change issues and their linkages to the SDGs, while it elaborates on challenges and gaps in the efforts for integrating climate change into school education. The results of the analysis are used to inform some potential future steps that are proposed.

Below, CCE is examined according to level, content and setting. These distinctions are made because of the different approaches, methods, responsible entities and relevant stakeholders found in the EMME countries:

- **Primary and secondary school education**
- **Higher education**
- **Professional development**
- **Technical and vocational education and training.**

Several countries assign educational oversight to two or three ministries, where a ministry of education oversees primary and secondary schools and, in some cases, technical and vocational education. Meanwhile, another ministry is exclusively responsible for higher education. Tertiary-level education is sometimes connected with the ministry of research, while professional development is either handled by a ministry of higher education or by a third, entirely different body. In some cases, no specific ministry or agency is directly responsible.

Indicatively, countries with **only one ministry** overseeing all levels of education include the following:

Cyprus:

The Ministry of Education, Sport and Youth includes separate departments for primary education, secondary education, general education, secondary technical and vocational education and higher education (MoEC, n.d.).

Greece:

The Ministry of Education and Religious Affairs (MERA) has several separate directorates, sections, inspectorates and institutions for the different types of all levels and functions of education (MERA, n.d.).

Saudi Arabia:

The Ministry of Education includes agencies for general education, university education and scholastic affairs (MoE, n.d.).

Similarly, countries with **two ministries** include:

Egypt:

The Ministry of Education and Technical Education oversees primary and secondary education as well as technical and vocational education. In addition, there is a Ministry for Higher Education, i.e. universities and tertiary education in general.

Oman:

> The country's Ministry of Education is responsible for education prior to tertiary education, while the Ministry of Higher Education, Research and Innovation is responsible for tertiary education as well as scientific research and innovation.

It is noteworthy that the ministries involved in education differ considerably from country to country in their position in governance hierarchies and their relationships with other ministries.

The different structures, and their competence and/or mandates *vis-á-vis* CCE, reflect prevailing philosophies, priorities and policies for both educational and environmental/energy policy orientations. The inclusion of all modes of education under a single ministry may point towards a comprehensive approach and a more harmonised sequence linking primary and secondary education with higher education. On the other hand, countries with two ministries point to educational approaches suggesting large and meaningful differences between primary/ secondary schools and institutions of higher education. They suggest that higher education should be linked more closely with research, which requires different means, tools and links to multiple ministries.

Perhaps even more important is that single or dual education ministries cannot elaborate responses in their climate change programmes without close co-operation with ministries involved in sustainable development and/or environmental policies. Such ministries range from energy and environment, of course, but extend to water, agriculture, transport, etc., which are instrumental in defining the climate change policies of the country that may support, or need to be supported by, formal and even informal educational interventions on climate change.

Such horizontal, interministerial integration across govern-

ance levels is still far from what is required not only to develop and implement CCE, but also to promote Agenda 2030 and achieve the SDGs.

5.2. National strategies/ implementation plans for CCE

5.2.1. Integration of CCE into educational policies

A review of documents and reports provided by the EMME countries makes it evident that the efforts to shape national education policies on climate change – including relevant school curricula – remain a critical part of CCE implementation in the region. In most cases, climate issues are subsumed under environmental education or ESD. Accordingly, many of the EMME countries (e.g. Cyprus, Greece, Egypt, Israel, Turkey, UAE) are actively elaborating and implementing policies that promote climate change instruction in schools, either directly or indirectly.

For its part, Cyprus has taken notable steps in developing and implementing policies to promote ESD, and to include CCE. The "whole school" approach is one result, whereby schools in Cyprus are encouraged to become sustainable by themselves. They develop their own sustainable environmental education policy, using the ESD curricula whereby climate change permeates all its thematics (water, biodiversity, energy, forest, poverty, etc.). Through the whole-school approach, the environmental and sustainable development issues, among them climate change, are developed with respect to the community and to the students' experiences at school (Zachariou and Korfiatis, 2020).

In the Abu Dhabi Emirates of the United Arab Emirates, the ministries of climate change and environment and of educa-

tion are collaborating on the so-called Our Generation Initiative to develop school curricula focusing among other issues on climate change. Furthermore, following a successful programme running since 2009, a countrywide Sustainable School Initiative has been established (United Arab Emirates, 2018).

Other countries have also worked with similar policies and approaches to climate change, although with vastly different levels of development and implementation. Often there is little continuity for a number of reasons, among them political instability. In some cases, even notable successes in *ad hoc* educational initiatives and programmes on sustainable development/CCE are rarely emulated. Lebanon has advanced its environmental education programming since a joint project produced an action plan, the "Mediterranean Environmental Reporting, Monitoring and Information System", which included indicators on education and environmental issues

(Nader, Salloum and Karam, 2008). However, Lebanese polices are not currently focusing on CCE or even ESD, although the country is addressing climate change and sustainable development in indirect ways. Discontinuity, which is not uncommon in other countries, reflects not only the country's difficulty with integrating ESD and CCE (Naoufal, 2014), but also its challenges overall. In fact, the Lebanon Voluntary National Review of Sustainable Development Goals (Government of Lebanon, 2018) mentions that *"the remaining targets showed mixed results, were not applicable or were not expected to be achieved on time – the most salient of which relate to poverty reduction and environmental sustainability"*. Since the release of the aforementioned report, Lebanon's situation has worsened.

The various country examples indicate different degrees of mobilisation among the education ministries for addressing climate change, either directly, through specific CCE inter-

FIGURE 4

Number of Countries with CCE policies
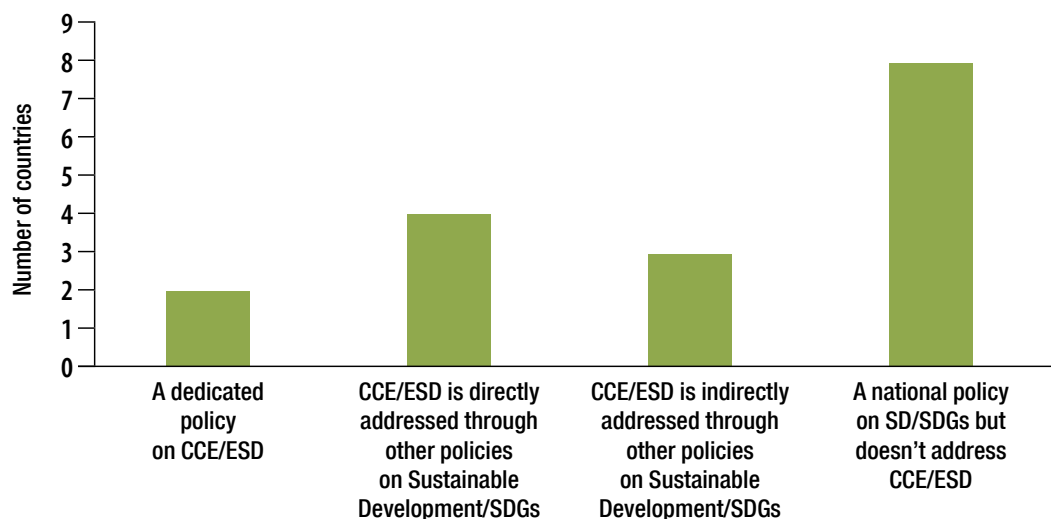
ventions, or indirectly in enriching climate issue references or responses through policies on ESD, sustainable development, the SDGs, etc., which include references to CCE and awareness.

In conclusion, the degree to which countries in the EMME region have adopted or implemented clear national strategies or policies that integrate climate change in school education is rather limited.

As seen in Figure 4, only two EMME countries have developed policies on ESD or CCE. The rest take up issues relating to ESD, CCE and the SDGs, but in a rather indirect and fragmented way, leaving room for further improvement.

For example, while Egypt still has no official policy on CCE for its schools, multiple policies and strategies address elements of CCE within ESD. Egypt's Vision for 2030 is characteristic, having issued a policy document that seeks to integrate elements of sustainable development and SDGs pertinent to ESD and CCE (MoP, 2015). Egypt's Third National Communication also emphasised the role of CCE, in addition to Egyptian government initiatives in support of CCE and environmental education in schools at all levels (EEAA, 2016). Similarly, Jordan addresses ESD and CCE through current policies, but it has also highlighted in official government documents the need to reevaluate existing policies and curricula to better target ESD/CCE rather than maintaining CCE within the *"wider context of green growth"* (Ministry of Environment, 2013).

Nevertheless, even in the above cases and in countries with dedicated policies and strategies for ESD, direct, clear reference to CCE is not evident. For example, in Egypt and Saudi Arabia, which have highlighted progress towards addressing environmental education and ESD within their reports and national communications, climate change is not directly nor explicitly addressed, but instead it is included, implicitly, within the context of broader policies and strategies and with a rather general association to sustainable development (AFED, 2019; ECIDSC, 2011; EEAA, 2016).

Other countries have engaged with sustainable development and the SDGs, advancing on several indicators. But they have not yet properly addressed CCE and ESD. The Kingdom of Bahrain's report on the SDGs claims progress on goals related to education, noting the kingdom's enrolment rates, its free and compulsory education, the increased spending on education, among other critical matters (Government of Bahrain, 2018). But the report makes no specific reference to CCE nor to environmental education, ESD or any other directly relevant concept.

Finally, without underestimating the region's recent efforts regarding sustainable development – achieving the SDGs and advancing CCE in official policies or strategic documents – it becomes evident that much more systematic work is needed. In a direct and efficient way, governments must establish essential content and use frameworks that explain the global threats of climate change, and in particular risks to the countries of the EMME region, which remains almost uniquely vulnerable.

5.2.2. Policies, strategies and plans for integrating climate change education in outdoor settings and in non-formal and informal education

With the present CCE priority on formal education, a sizable swath of people remains unaware of climate change and unequipped to engage in vital mitigation and adaptation efforts. A survey of Middle East countries found that people with college degrees constituted between 19% and 59% of the population (Hassan and Fouad, 2019). Informal CCE would therefore be instrumental for raising awareness, developing capacities and providing support through civil society initiatives. The impact of non-formal and informal education on climate change awareness (and willingness to help) should be properly appreciated, acknowledged and exploited.

If CCE were shared through non-formal educational modes, outside school settings under real-world conditions, families and school neighbourhoods could receive significant benefits from clear messages on climate change.

Targeted audiences and a general public better able to comprehend the magnitude of the challenge of climate change and its scope are important for the implementation of relevant policies. Inspiring a regional willingness to participate in appropriate mitigation and adaptation measures related to climate change has immeasurable benefits.

Greater awareness of climate change has the additional benefit of reducing disaster risks from extreme events. Apparently, community perception of climate change is a factor in increasing local awareness of climate disaster risk. This encourages more disaster risk reduction actions by the communities themselves, and thus provides a driver for sustainable community disaster risk management initiatives (Hori and Shaw, 2014).

A sizable gap can be bridged through well-designed and properly implemented education in non-formal and informal settings, as we have seen recently in the EMME countries.

Thus, it can be seen that increasing awareness both among students' families through non-formal education, and among the general public through informal education and awareness-raising campaigns, constitute core climate change strategies for many EMME countries, touching on both mitigation and adaptation.

However, the important methodological distinction made between the two different kinds of education beyond formal education – namely, non-formal and informal education – should be always kept in mind when dealing with their implementation, since even in official documents one can find ambiguities and confusion regarding relevant policies and provisions.

Policies, strategies, structures and programmes for non-formal and informal awareness campaigns are more prominent among the UNECE/Mediterranean countries (Cyprus, Greece, Israel, Turkey), most probably as a consequence of the systematic work carried out by the UNECE Steering Committee on ESD. A network of more than 50 ESD centres (supported by Greece's Ministry of Education and local authorities) has become a key tool for formal and non-formal CCE, an important scheme with a tradition going back 30 years. An analogue network also exists in Cyprus, where environmental education centres are considered as exemplars of non-formal education offering complementary content for schools teaching CCE and ESD. Several good examples from other countries are given in other sections (e.g. under formal education).

In Palestine, various informal education initiatives on climate change have either been planned or are underway (EAQ, 2017). In Egypt, the importance of informal education in parallel to formal education is recognised and appreciated.

Consequently, Egypt's Third National Communication Plan observes that *"Climate change awareness campaigns through the education system have expanded greatly at all levels. Public awareness campaigns promoting waste reduction, energy conservation, reducing plastic bag use, and so on, have emerged in the past few years"* (EEAA, 2016).

The United Arab Emirates has also developed and implemented a National Environmental Education and Awareness Strategy, which sets six strategic goals for education, empowerment and stakeholders' involvement in initiatives dubbed "Water Wise" and "Power Wise", "Heroes of the UAE", "Sustainable Colleges", the "Sustainable Campus" and the "Ecological Footprint Initiative" (United Arab Emirates, 2015).

In 1996, in line with Jordan's National Environment Strategy, the country established the National Environment Action Plan outlining the steps to ensure and protect the environment of Jordan for future generations. The NES included five strategic recommendations for action, listed below, promoting informal education and awareness raising as vital for the overall plan:

1. Establish an environmental protection legislative system, including the introduction of a comprehensive environmental legislation, and the creation of a national environmental impact assessment process;
2. Strengthen environmental protection and conservation organisations, including national environmental authorities, government departments and non-governmental organisations;
3. Expand the protected areas of Jordan;
4. Enhance public awareness through environmental education programmes, awareness of environmental health and the growth of urban natural parks and green areas; and

5. Identify main areas to be urgently addressed in order to safeguard the environment, e.g. water resources management (Hashemite Kingdom of Jordan, 1997).

Iran's National Communication notes that it would be of significant benefit for Iran to recognise the fundamental values enshrined in the United Nations Convention to Fight Desertification, which includes concepts and initiatives to promote educational, training and public awareness programmes. This approach engages the public on desertification and in mitigating climate change impacts, a much more effective approach in addressing the country's challenges (Islamic Republic of Iran, 2003).

Despite the aforementioned and many more initiatives, the general public still lacks the necessary awareness on the scale and urgency of climate change. This has had an adverse impact on government initiatives that address climate change (Asem and Roy, 2019). Effective informal education policies are vital in view of the seriousness and urgency of climate change, emphasising the need for the region to continue building on whatever successes previous policies have achieved, amending them when necessary and intensifying efforts to raise public awareness on climate change and related environmental issues.

Progress of Climate Change Education in Formal Education: Primary and Secondary School

6

6.1. Integration of climate change education and its relationship to quality education

In order to achieve sufficient awareness and knowledge about climate change so that nearly everyone can engage in mitigation and adaptation efforts, relevant topics should be integrated into the curricula at all school levels. This approach has a direct impact on students through classroom instruction. It also indirectly heightens awareness about climate change and other environmental and social issues by reaching students' families. The ability to comprehend natural and socio-economic processes underpins our facility with complex environmental interactions. UNESCO researchers have observed a correlation between performance in science subjects and environmental awareness (UNESCO, 2008). It should be noted that ESD (which includes CCE) is also becoming synonymous with quality education (QE) (Kadji-Beltran et al., 2017).

Therefore, QE, ESD and CCE are becoming inextricably linked; any focus and investment in one will enhance the others. One potential impact: better educational outcomes rest on the knowledge and information students acquire through education on climate change. This transformative approach occurs in the very way students understand and address critical challenges. In a study of Greek students on the knowledge they obtained on climate change, it was found that *"Although students have quite clear ideas about the impacts of CC, they seem to be rather confused about solutions and especially causes"* (Liarakou, Athanasiadis and Gavrilakis, 2011). This finding implies that while the education system raises awareness and knowledge around climate change, the critical, creative and systemic thinking required to tackle this complex problem remains underdeveloped. This kind of thinking is

exactly the focus of ESD and CCE, which also improve QE across the board.

School curricula in the EMME region will want to fold in the benefits of ESD and CCE, which boosts QE. Progress has already been made on the need to reorient CCE towards sustainable development. Yet most curricular trends remain focused on general implementation of environmental education or ESD on the assumption that they are still highly relevant for CCE. Experience has shown that any progress made on this front, whatever the "entry point", could through skillful intervention of educators translate into effective implementation of CCE within school curricula. The question here is "are there enough educators able to 'skillfully' transmit knowledge and ability?".

Important CCE topics in the school curricula of the EMME region include the sources and causes of climate change, the role of carbon dioxide (CO_2) and other GHGs, in addition to general sustainability and environmental issues (Kadji-Beltran et al., 2016; MoE/UNDP, 2015). Most of the CCE in schools focuses on the natural science of climate change. Priority themes for climate change centre on scientific causes and technological solutions; definitions and concepts; the dangers of climate change; energy, fossil fuels, CO_2 and GHGs (and reducing GHGs); air composition, plant respiration and photosynthesis; transportation; and then animal habitats, global environmental issues, biodiversity, waste, sea level rise, ocean acidification and other critical topics (Kadji-Beltran et al., 2016; Ministry of Environment, 2013; MoE/UNDP, 2015; OECD, 2018).

Although all these topics are central to CCE, they neglect to treat the humanities, social sciences and economics. Moreover, most EMME countries are failing to use an interdisciplinary approach to climate change (UfM, 2014a). This sectoral, siloed approach remains a notable shortcoming for educa-

tional and sustainable development interactions throughout the region that should be systematically addressed in the curricula for the successful implementation of CCE and ESD (UfM, 2014a).

Although several activities have been conducted to address this condition, the situation is not changing easily. As reported in Bahrain's Third National Communication, efforts to address this issue included the production of instructional materials targeted at fourth and fifth graders to create an understanding of climate change. The emphasis was on enhancing curricula with principles of climate change and improving the abilities and skills of students. Primarily, what was produced was again through climate-change-related nature science projects (SCE, 2020). This result confirms a common aspect of CCE observed around the EMME region (as well as globally) in which climate change is considered almost exclusively a scientific issue that must be understood and addressed in physical, chemical, climate and technology terms. However, in the context of a holistic approach towards CCE, it is imperative that students understand and contextualise climate change as a major challenge that affects every aspect of modern life, health and economy and therefore could be related to every subject and topic. This contextualisation is apparently lacking within the countries included in the study, with only some minor exceptions.

Other studies have noted that it is not enough to just have curricula addressing climate change. In a study conducted with Iranian teachers, it was found that, in addition to the fact that approximately 45% of the respondents stated that climate change was not directly addressed in school curricula, 55% of the respondents needed additional support and training in designing and preparing lessons on CCE (Karami et al., 2017). This finding demonstrates the importance of a bottom-up approach that parallels a top-down regulatory approach. A centralised curriculum that offers ESD and CCE

could be crucial in orienting and guiding educators towards more universal instruction on climate change. However, as confirmed by the present work, it is also very important to have adequate numbers of qualified teachers able to prepare scientifically sound and locally relevant school plans on climate change in decentralised settings. Effective lessons on ESD and CCE engage students because they are connected to the needs of their own communities and consider diverse situations, socio-economic backgrounds and cultures.

Improving school curricula remains the most straightforward way to introduce CCE in classrooms, and seems to be the necessary new focus for EMME countries. Despite these advances, climate change is often taught in ways that do not capture its cross-cutting nature, as it has the following characteristics:

- CCE is not a stand-alone topic, yet it is often taught that way. An interdisciplinary approach could transform teachers and students into critical thinkers and problem solvers.

- Although climate change is a cross-cutting phenomenon, few educational interventions teach adaptation and mitigation.

- Approaching climate change through a scientific lens requires a focus on properly understood physicochemical causes and technological solutions. Still it frequently neglects socio-cultural and economic causes and consequences.

- Because they hold knowledge-based places in the curricula, ESD and CCE teach students to identify causes and challenges. Research has found some examples where skills, actions and critical thinking are being encouraged and taught. But considerable work remains to be done on these core elements.

6.2. Pedagogical approaches to climate change education in school curricula throughout the EMME region

In developing primary and secondary school curricula, educators need to fold in new teaching methods so CCE can have transformative impacts. In fact, ESD requires a student-centred teaching shift that empowers educators and students to find creative solutions to critical global and local problems (Mercer and Kythreotis, 2020). But teaching methods often fall short of these lofty ambitions (Shaw and Tran, 2012). Significant knowledge gaps persist, both about climate change itself and regarding the pedagogical tools needed to deliver CCE.

A study in Iran found that teachers were often unaware of CCE as a concept and of its transformative potential. Also, they did not have the required materials and resources (Karami et al., 2017), such as CCE textbooks, workbooks, teachers' guides and CD-ROMs. Moreover, the teachers stated the need for professional development through training on climate change, including on CCE methodology, so they could develop relevant lesson plans and activities (Karami et al., 2017).

Progress has nevertheless been made on the teaching methodologies and pedagogical approaches to CCE in schools. Initiatives, materials and projects appropriate to ESD instruction in the classroom, have, according to the Arab Forum for Environment and Development, produced notable progress in the Arab region over the past decade (AFED, 2019; Scoullos and Malotidi, 2004).

Despite these improvements, useful pedagogical approaches such as community-based learning (CBL) remain unexploited through the region. Impressive exceptions are Greece and Cyprus (see below, in this subsection), where instruction is focused on students engaging with their surrounding communities to address and find solutions to local challenges together with local stakeholders. In fact, in community-action programmes, schools and communities become transformative and legitimate places to carry out sustainability actions. All interested parties – students, parents, community members – can participate and learn. CBL is frequently understood (and perhaps much better classified) as *non-formal education*, although it can be equally well examined as extended formal education (Zachariou and Kadji-Beltran, 2005).

The difficulty of implementing CBL (see Karami et al., 2017), however, suggests that in many countries it may remain underutilised for the foreseeable future.

We observed above that CCE at the formal level has favoured the scientific approach, rather than one focusing on socio-cultural or community-based values that highlight justice, ownership and solidarity. This suggests that policy makers view climate change primarily as a physicochemical phenomenon, largely disconnected from its societal, cultural or economic settings – which are as vital in effective policy making and political action.

Despite the scarce systematic CBL opportunities, many EMME countries possess abundant handbooks, guidelines and other pedagogical tools (based on hands-on, practical implementation) that encourage holistic engagement with climate change.

For example, in Lebanon, a guidebook for integrating ESD was developed that included detailed examples and techniques for community-based learning (Bacha and Bahous, 2011). Also, a Teacher's Guidebook on Climate Change for Schools (MoE/UNDP, 2015) introduces climate change concepts and history, the impacts of climate change and how climate change can be taught in an interdisciplinary way,

with themes that connect to school lessons in subjects such as English, geography, science, math, etc. It offers detailed technical support to teachers working across grades and educational levels to further CCE in a more structured way, while giving teachers the necessary tools and materials to develop these concepts in the classroom.

Cyprus and Greece have published a series of educational tools based on experiential and transformative learning. For example, in Cyprus, the subject of climate change is connected in systemic ways to environmental and even traditional, non-sustainable development topics. Pedagogical and educational support for climate change covers the thematic units of the ESD curriculum, where climate change is studied on the ground in "Issues in Education for Sustainable Development" and "Rational Waste Management". Both guides cover production and consumption, transportation, desertification, tourism, poverty, waste, etc. A recent educational package produced by the Cyprus Pedagogical Institute applies ESD pedagogical techniques to topics of waste management and climate change – from debates, simulations, use of new technologies and moral dilemmas, to concept mapping, experimental investigations, bibliographic research, field study, etc. These tools support the relevant curricula in primary and secondary education and can be extended to non-formal education (MoARDE and DoE, 2018; see also section 9.2).

Appropriate pedagogies used in Greece are described in this report mainly in connection to non-formal ESD and CCE. These educational tools build on a three-decade-long history and provide decentralised, hands-on workshops to students and local stakeholders, including CSOs, NGOs and productive sectors. They are conducted in "real" environments outside schools, but under the supervision of the Ministry of Education, managed jointly by educators and visiting educators (who are usually credentialed in ESD) at the centres.

The centres enjoy the financial support and actual involvement of the local authorities. These "Centres of Environmental Education" (53 such operate in all Greek prefectures) are currently being transformed into "Centres of Education for Sustainable Development" and they are also quite instrumental for CBL. They have a series of dedicated courses and programmes for climate change, and the most recent one (July 2021) was organised by "Action Synergy" in the framework of Erasmus +KA2 Project (http://action.gr/). These centres have been valuable and innovative both in the content of their teaching and the format covering formal, primarily non-formal and, to a certain extent, informal ESD needs and functions.

6.3. Climate change education and linkages with sustainable development goals

Most of the EMME countries are focusing on the SDGs, placing heavy emphasis on the relevant policies within their national strategies and goals (ECOM, 2017; Government of Bahrain, 2018; Government of Iraq, 2019; MoE Jordan, 2014, MoE Lebanon, 2016). Furthermore, many have policies in place and resources to support integration of the SDGs within their formal school curricula (Government of Cyprus, 2007; Ministry of Environment, 2013; MoE/UNDP, 2015). In some cases, however, the relevant resources and commitment seem to be greater than those directly concerning CCE. Though many governments highlight the connection between climate change and education, and almost all address SDG 4 and education relating to the SDGs, most often the emphasis is on conventional educational issues such as literacy rates, school retention, percentage of school-age children currently enrolled in school and other metrics. For example, though education is mentioned in the Palestinian Initial National

Communication Report to the United Nations Convention on Climate Change (UNFCCC) (EQA, 2016), it is considered mostly in relation to the number of schools and universities, literacy rates, etc. Similarly, Oman exemplifies this approach, as it has achieved not only universal education over the past decade but also succeeded with an ambitious decentralisation of its schools with positive outcomes (Westrick and Miske, 2009). The examples above demonstrate how some EMME countries view education in light of climate change and how progress in general education can be attained. Because climate change is considered a threat to many social and cultural achievements and milestones, the march towards SDG 4 is seen in several countries (mostly from the Arabian Peninsula) to represent remarkable progress also on climate change. As an aside, achieving SDG 4.7 does not have the same urgency.

Partly, this might be because countries are elaborating conclusive national plans to address all SDGs, including SDG 4, whose goal is to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". In Kuwait's 2019 Voluntary National Review, special attention was given to the country's successes with SDG 4 through *"revisiting school curricula, enhancing school environment and improving school administrations' competencies to better use computers and IT during the teaching process"* (Government of Kuwait, 2019).

Of course, as each country has its own strategy and approach towards achieving the SDGs, all of the goals are addressed to some degree. However, the described approaches are disassociated from and unrelated to education, and in particular to CCE. While the importance of integrating SDGs into the formal curricula is mentioned in many of the strategies and policies, these references are frequently used outside the context of CCE; they usually focus on informing students about the governments' initiatives, achievements and priorities without imparting any meaningful content on the SDGs themselves and their relation to the students' own lives and communities.

The relationship between the SDGs and climate change does not, however, end in integrating SDG 4, SDG 4.7 or even SDG 13 into education. Rather, it is equally, if not more, important to consider through education how climate change disrupts advancement of all the SDGs, intensifying poverty, increasing inequalities (both within and among nations), stifling economic growth and lowering agricultural output (Koubi, 2019). While none of these will directly impact education (i.e. SDG 4), they could have strong indirect negative effects. Weaker economies will lessen their spending on education; lack of economic growth can spur migration, straining educational systems; and a crush of other factors could create negative learning environments and situations throughout the EMME region.

6.4. Challenges for integrating climate change in school education

Challenges for integrating CCE into school education can be classified into general challenges faced by nearly all countries, and those specific to certain countries of the region.

General challenges are best summarised by slightly amending the findings of Shaw and Tran (2012):

> *"Integrating CCE into school education is a complex endeavour that requires strong national political will, a systematic approach, and sustained action. The institutional and technical capacity in many countries is still weak, and the financial resources needed to build these capacities are limited. In addition, there is resistance to incorporating CC issues and materials on the grounds that the formal curriculum is already heavily charged. Indicators*

of performance and effectiveness of the CC curriculum, which would serve as valuable benchmarks for implementation, are also lacking. There is a need to reach consensus on what these indicators should be."

Specific challenges, many of them common in other regions, include:

- Lack of trained educators equipped with basic knowledge on climate change issues and about new methods and materials for embedding climate change responses into their teaching and pedagogical techniques, including on CBL.

- Difficulties in integrating CCE within non-scientific subjects and topics, particularly those focusing on socio-cultural challenges and solutions related to climate change.

- Inflexibility around multidisciplinary, cross-disciplinary and interdisciplinary approaches towards climate change within formal school curricula in ways that encourage communication and collaboration among teachers, classes and schools.

Furthermore, the documents, policies, strategies and other reports, containing concrete and specific incentives for promoting CCE within schools and formal education, are elusive. There are few incentives for schools belonging to UNESCO-supported networks, such as eco-schools (Eco-Schools, n.d.) and eco-mobility in Greece, Cyprus, Israel and Lebanon. The regional trend is to focus on regulatory policies around CCE, which produces policy recommendations, strategies, etc., but incentivising, rewarding and, most importantly, funding CCE are vaguely mentioned at best. Meaningful and in-depth discussion of this issue is missing at national and regional levels.

These challenges are not insurmountable, and can be ad-

dressed first with firm political will and then with coherent, lasting educational policies and adequate funding.

In fact, the needed conditions and resources can be secured by building upon the foundations set by the various global, regional and national initiatives in which the countries have been involved or have implemented. The strategies for addressing climate change for ESD and for achieving the SDGs all provide solid starting points and "entries" for funds that can be secured and utilised for CCE at all levels of education.

6.5. Gaps in addressing climate change education in school education in the EMME region

This report found the following gaps in CCE in primary and secondary schools:

- Societal and cultural elements tend to be overlooked in CCE.

- Critical thinking and problem-solving are not part of CCE, which is dominated by knowledge-based approaches that teach "what climate change is".

- There is scant focus on necessary (direct and explicit) responses to climate change compared with the generic approaches typically seen in ESD and sustainability topics.

- Knowledge, preparation and training of teachers on climate change are inadequate; new and innovative teaching methods are in little evidence.

- There are few incentives (moral and material) to award educators and schools for attaining goals on CCE interventions.

6.6. Proposed policies for addressing climate change education in school education in the EMME region

Based on the previous research, it can be seen that CCE in primary and secondary schools not only has the potential to address the critical challenge of climate change but also to boost the quality of education (QE) and achieve a more aware, engaged and active society. Policies in the region should reflect the importance of CCE/ESD and support a continued integration of CCE in the schooling systems of the EMME countries through the following policies:

- Utilise existing resources already developed at global, regional and national levels to set guidelines for regionally focused curricula in addition to the nationally centred ones addressing ESD and CCE in school education.

- Encourage national and regional school accreditation bodies to develop standards, references and indicators focusing on CCE and ESD within their quality assurance and accreditation requirements.

- Establish dedicated EMME offices or committees within the relevant ministries of the countries dedicated to the development and facilitation of integration of climate change topics within all the relevant subjects taught in schools.

- Provide awards, moral incentives and funding and financial incentives to schools and school districts that demonstrate good practices and excellence in addressing CCE.

- Adapt existing resources developed from various projects and initiatives to enhance and complement national curricula taught in schools of the region.

- Emphasise the importance of societal and cultural topics within the context of climate change and ESD.

- Engage in regional co-operation for sharing material, curricula, best teaching practices and local research to develop local/national and common/regional approaches to CCE, considering the traditions, values, needs and cultures of the EMME region.

"Education has the potential to address the challenge of climate change, boost the quality of education and achieve a more aware engaged society. Schooling systems should support the integration of climate change education"

Addressing Climate Change | 7
in Higher
Education

7.1. Government and university initiatives

Universities and other higher education institutions (HEIs) in the region have developed programmes, modules and courses addressing climate change, and are at the forefront of efforts to tackle related challenges. Indeed, most of the progress made in addressing CCE at any level has been driven by HEIs and research centres.

The Government of Jordan asks HEIs to educate specialists on climate change and "professionals in public and economic sectors who could benefit from green development". The document underscores the need to incorporate climate change into curricula at all schooling levels. It envisions the development of a network of climate adaptation specialists and education programmes and projects on climate change organised in co-operation with the Center of Climate Change. The document also suggests that a National Climate Change Education Work Force be created with the participation of the Ministry of Environment, the Ministry of Education, NGOs, academic centres and educational and technical training centres (MoE Jordan, 2014).

Many universities in EMME countries have undertaken CCE initiatives. For example, Sultan Qaboos University in Oman has played a critical role in tackling climate change (Ahmed and Choudri, 2012), supporting initiatives such as making a GHG inventory for the Sultanate of Oman Biannual Update Report (Ministry of Environment and Climate Affairs, 2019) that was submitted to the UNFCCC.

To highlight the overall importance of HEIs to climate change and CCE, Times Higher Education (THE, 2020) assessed the efforts of universities around the world to advance towards the SDGs. The survey findings do not indicate universities'

level of efforts or achievements. Almost all higher-level academic institutions in the EMME region carry out studies on different aspects of climate change, including climate modelling and forecasting, adaptation and impacts, and mitigation in particular (Ministry of Agriculture, Natural Resources and Environment, 2013). However, for various reasons, several of the most active institutions in climate change and related issues are not included in the rankings. For example, several Greek universities have been mobilised on ESD and CCE since the mid-1990s. Their Rectors' Congregation adopted the *Sustainable Development Charter of the Greek HEIs* in 2011 (http://unescochair.chem.uoa.gr/Xarta_GREEN_ UNIV_ ENG.pdf). The Charter is currently (2022) being revised and updated.

Nevertheless, despite their drawbacks, rankings still have the advantage of reflecting the degree to which HEIs in the region perceive the importance of climate change and CCE, as well as how much they prioritise it over other SDGs.

In view of the foregoing, it should come as no surprise that many HEIs in the EMME region provide courses, modules and other educational programmes that directly or indirectly address climate change and sustainability. Also, many studies consider the potential for addressing climate change and sustainability issues in university education.

In some cases, climate change has been integrated into otherwise traditional university programmes, showing some promising signs of the renovation and reorientation of curricula towards the interdisciplinary approaches required by the nature of climate change. In Bo aziçi University, Turkey, students in the physics undergraduate programme can take classes in environmental studies that include "global climate change" and "the climate" (BU, 2020).

Egypt has also integrated courses and topics related to cli-

mate change into many different university departments, including architecture, urban planning, and design and civil engineering. Courses include "energy conservation in buildings", "overcoming inefficient energy consumption in contemporary architecture" and "principles of green architecture" (EEAA, 2010).

Climate change's integration into Egyptian university curricula has advanced steadily since 2010, as increasingly complex topics are introduced and taught. Several feature indigenous and local environmental experiences (EEAA, 2016).

In Cyprus, Frederick University (FU) is undertaking CCE as it prioritises efforts to advance towards the SDGs (FU, 2020).

7.2. Post-graduate programmes on climate change

A wide-ranging spectrum of post-graduate programmes address climate change directly or indirectly. These include indicatively the following.

King Abdullah University of Science and Technology, Saudi Arabia (KAUST, n.d.)
- MSc and PhD in Environmental Science and Engineering
- MSc and PhD in Marine Science

An intrauniversity post-graduate course of the National and Kapodistrian University of Athens; the National Technical University of Athens and the Aristotle University of Thessaloniki with three directions (NKUA, 2019):
- Science Education/Chemistry "Education for Sustainable Development" (with specific references to CCE)
- New educational technologies

National and Kapodistrian University of Athens (NKUA, 2019)
- Post-graduate course (since 1975) on Oceanography and the Management of Marine Resources, gradually enriched with many topics and lectures on climate change and its impacts on the marine environment.
- National Technical University of Athens, Greece Post-graduate Programme in Environment and Development
- Post-graduate Programme in Energy Production and Management

International Hellenic University, Greece
- MSc in Energy Building Design
- MSc in Environmental Management/Sustainability

The Cyprus Institute, Cyprus
- MSc in Environmental Sciences
- PhD in Energy, Environment and Atmospheric Sciences

Frederick University, Cyprus
- MSc in Information and Communication Technology for Education for Sustainable Development

Ain Shams University, Egypt
- MSc and PhD in Environmental Human Sciences
- MSc and PhD in Environmental Educational Sciences and Environmental Media
- MSc and PhD in Environmental Agriculture Sciences

Ben Gurion University, Israel
- MSc in Ecology of Dry Lands, Solar Energy and Environmental Physics
- Irrigation and Plant Environment
- Environmental and Aquatic Microbiology and Environmental Studies

Also, the University of Bahrain and the Arabian Gulf University

offer MSc programmes in environmental sustainability and sustainable development, respectively (Kuwari, 2005).

All such post-graduate programmes aim at creating a highly skilled and educated workforce with abilities to tackle the various challenges associated with climate change. Some address the operational aspects of efforts to mitigate climate change. Examples include the Suez Canal University in Egypt and Jerash University in Jordan, which offer MSc degrees in climate change, sustainable agriculture and food security. The origin of this degree is a project funded by Erasmus+ and run by a consortium of international partners from five countries (Greece, Italy, Cyprus, Egypt and Jordan) (CCSAFS, 2015). Other programmes were similarly developed as cross-regional or cross-country initiatives such as a distance diploma developed in co-operation between the American University of Beirut, Lebanon; the Lebanese-American University, Lebanon; the American University of Cairo, Egypt; the Helwan University, Egypt and the Suez Canal University. Egypt aims at developing a joint diploma on green technology through a distance study programme.

Another interesting development is the establishment of HEIs focused entirely on addressing climate change. For example, the Climatology Research Institute in Mashhad is Iran's only specialist organisation that works on climate change modelling. It benefits from collaboration with the economic cooperation organisation of the region, which provides advice to universities and supports study groups and theses on climate issues. The organisation holds workshops for its members (including Syria, Iraq and Iran from the EMME region), co-ordinates with regional centres on efforts to control natural hazards and co-ordinates with the official representative of the Iran Meteorological Organization and the Global Climate Programme of the World Meteorological Organization's climate services and with country drought units (Islamic Republic of Iran, 2017).

The evolution and depth of relevant course content is surely because a growing number of academic researchers are focusing their research on climate change. In the National and Kapodistrian University of Athens alone, there are more than 15 post-graduate courses related directly or indirectly to climate change (NKUA, 2019), a situation similar to many of Greece's 26 public HEIs. Many HEIs in the EMME region are developing programmes addressing critical elements of sustainable development and climate change.

Since the developments are very recent and there are no indicators, statistics or monitoring of these post-graduate courses, we do not know if and to what extent their objectives are being met. It is important to stress that not all of them aim to produce professionals focused on climate change, but instead to ensure that professionals in other fields are well aware, informed and able to closely follow developments on climate change issues, adjusting accordingly (if needed and relevant) their own priorities, choices, programmes and agendas.

Though significant progress has been made in developing post-graduate programmes in all EMME countries, few programmes train prospective teachers, especially in education departments. Very few countries include CCE dimensions in HEIs' pre-service courses for educators. For example, in Cyprus and Greece in most of the educational departments at the graduate level, ESD and climate change are discussed in depth within specific modules or projects. Additionally, these countries provide master's and PhD programmes on ESD, which systematically examine climate change issues in conjunction with the rest of the SDGs (FU, 2019a, 2019b, 2019c). A potential way forward in addressing the lack of climate change–related issues in educators' pre-service courses could be through cross-regional co-operation, considering that the most successful examples of academic programmes were the product of collaboration among institutions across the region.

7.3. Challenges

Among the many challenges associated with integrating climate change in higher education, the most prominent arises from the very nature of this field of study. Climate change is an interdisciplinary topic that must be approached, studied and understood from multiple angles, approaches and lenses. To teach climate change in universities requires skills and knowledge – to support entire study programmes on all the topics needed for a comprehensive approach – that are not always available in a particular department or research team. This is further complicated by the wide range of fields, sub-fields and disciplines essential to provide a holistic education on climate change: in addition to the fields of sociology, anthropology, economics, business administration and humanities, these include the more traditional and basic disciplines of climatology, physics, chemistry, biology, engineering, geography, marine sciences and others, which help in a critical understanding of the phenomenon, its multiple root causes, its direct and indirect impacts, and measures to promote effective adaptation towards and mitigation of climate change.

Furthermore, because university teaching needs to be closely linked to relevant research, funding remains a key challenge for research on climate change by HEIs in most EMME countries. In fact, a key finding of a report on the challenges faced by the higher education sector in addressing the SDGs and climate change in Bahrain is that *"little funding is provided for scientific research by the MOEHE and the local universities through their core budgets while most of the funding raised is through regional, bilateral and international projects"* (SCE, 2020). This reflects more or less the situation in the entire region, where funding for research and climate-change-relevant educational programmes is scarce and is done on a case-by-case basis, frequently supported opportunistically by rather short-term international projects and with limited or no medium- and long-term programmes and investments by the governments of the region to sustainably maintain them.

7.4. Gaps

Gaps addressing CCE in higher education include the following:

- With the exception of a few programmes, there is a lack of university programmes (both undergraduate and postgraduate) on pre- and in-service teacher education directly addressing ESD and CCE, throughout the EMME region.

- While some elements, topics and lectures related to climate change are integrated in the undergraduate curricula, no programmes directly address the topic at the undergraduate level. Specialisation in climate change issues is usually and traditionally expected to take place at the post-graduate level.

- Also, climate change and sustainable development are too rarely addressed in depth in courses that are not directly related to the natural sciences or engineering (e.g. medicine, business, arts, sociology, etc.).

7.5. Possible policies

Higher education in the EMME region has made significant progress in engaging with CCE at different levels and in different ways. Major challenges and gaps remain, however. Furthermore, due to the focus on academic freedom and independence, governmental initiatives for integrating CCE within higher education cannot be as straightforward or as direct as with other types of education. The following policies are

therefore proposed to better address CCE in higher education:

- Provide incentives (including funding) for the development of interdisciplinary undergraduate programmes addressing climate change and sustainability issues that could lead to knowledge and skills essential to addressing climate change challenges on the ground.

- Include provisions and requirements in national and regional higher education accreditation institutions for adequate courses and programmes to allow integration of the topics of sustainable development and climate change in their curricula.

- Develop regional initiatives to promote and support the teaching of sustainable development and climate change in higher education through incentives (including increased funding), facilitation of intrauniversity exchanges for technical and educational support, and improved regional rankings.

- Encourage national and regional higher education accreditation bodies to develop standards, references and indicators focused on CCE and ESD within their quality assurance and accreditation requirements.

- Promote the development of undergraduate and post-graduate programmes directly addressing climate change and other topics related to the adaptation and mitigation of climate change at the national, regional and global level.

- Establish or enhance funds for academic research and improvement of CCE courses in higher education. Develop and reorient university curricula at all levels to better address CCE and ESD through new and/or already established funding mechanisms.

- Promote effective regional co-operation schemes between and among universities through the establishment of bilateral and multilateral regional networks and linkages of universities and other HEIs in the EMME region.

- Support the participation of universities in regional conferences, projects and programmes aimed at addressing climate change (e.g. Horizon 2020 programs, Partnership for Research and Innovation in the Mediterranean PRIMA, etc.).

"Climate change is an interdisciplinary topic. To teach climate change in universities requires skills and knowledge that are not always available in a particular department or research team"

Climate Change | 8
in Professional
Development

8.1. Addressing climate change in professional development courses

In the rapidly changing world of the 21st century, the roles and functions of schools are constantly changing – and so is what is expected of educators. They are asked to teach in increasingly multicultural classrooms, to make more effective use of information and communication technologies (ICTs) and to deal with complex issues such as climate change (van Tartwijk et al., 2009).

No matter how comprehensive pre-service training is, it may not be sufficient for the challenges and requirements teachers face over the course of their careers. A review of teachers by the Organisation of Economic Co-operation and Development (OECD, 2005) notes that *"effective professional development is an on-going process including training, practice, feedback and provides adequate time and follow-up support. Successful programmes involve teachers in learning activities that are similar to the ones they will use with their students and encourage the development of teachers' learning communities"*. This section examines a few examples of professional training programmes in countries in the region.

In Cyprus, teachers' ESD in-service professional development/ *continuing professional development* is characterised by holistic and long-term planning, concerns teachers at all levels and is offered either through interdepartmental programmes of professional training or on the basis of the needs and particularities of each level (Zachariou, Kadji, Vare and Milican, 2019). Optional training seminars are offered, with emphasis on the interconnection and systemic examination of environmental issues and sustainable development issues, in which climate change is a key issue for discussion and analysis. Moreover, through the training seminars, spe-

cial attention is given to familiarising teachers with teaching techniques that can be applied inside and outside the school to improve the study of climate change. Training seminars aiming to familiarise teachers with additional educational tools and resources that assist in the implementation of the curriculum of the EE/ESD are offered, with particular emphasis on climate change. Finally, the training of teachers on the issue of climate change is experiential and conducted in specific areas of environmental interest through two-day and three-day training seminars at the Environmental Education Centres, which is the most concrete non-formal education structure for ESD in Cyprus (Zachariou and Korfiatis, 2020). The Cyprus Pedagogical Institute, as the responsible institution of the Ministry of Education and Culture for the education and training of teachers, is planning to provide educational seminars specifically on climate change with the cooperation of other agencies and services involved in the issue (Department of Environment, Meteorology Service, Energy Service, Forestry Department, etc.) (MoAERD and DoE, 2018).

Greece provides many opportunities for the professional development of educators. It provides grants for the pursuit of master's or doctorate degrees on issues related to the environment, sustainable development and climate change. Courses are organised by relevant (mostly regional or local) services of the Ministry of Education and include a variety of workshops, usually of one to four days' duration. Participants may obtain attendance certificates, which are useful for advancing their careers.

In Jordan, one of the most important sources for developing professional skills and education methods integrating ESD and CCE into the curriculum is the Queen Rania Teacher Academy (QRTA). Established in 2009, this independent non-profit organisation seeks *"to support teachers through professional development and connecting them to one another"* (QRTA, n.d.[a]). Among the programmes it offers is the

Education for Environment Sustainability training programme, which *"aims at changing students' attitudes and behaviours regarding environmental issues such as water, energy, littering and global warming"* (QRTA, n.d.[b]). The ESD programme of QRTA was developed into an *"inquiry and project based, interdisciplinary, training"* programme (QRTA, n.d.[b]). It was further supported through the establishment of the QRTA ESD Training Network, which connects teachers within Jordan and within the region to support and promote ESD as a tool for enhancing the quality of education (UNESCO, 2014b).

Regular workshops play an important role in the professional development of teachers in the EMME region. This can also be seen in events such as the GCC Education for Sustainable Development Workshop, which is organised by UNESCO in Doha, Qatar. Such events have supported regional cooperation in promoting ESD and CCE in the Arab Gulf, involving participants and organisations from Oman, Saudi Arabia, Qatar and other Gulf States (Doha, 2017).

Through the Mediterranean Educational Initiative for Environment and Sustainability (MEdIES), the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE) hosts a series of programmes conducted by university professors and ESD practitioners supervised by the relevant UNESCO chair of the University of Athens, which issues attendance certificates. Programmes include lectures on the evolution of sustainable development, environmental education, ESD and climate change; a theoretical approach to pedagogies and methodologies, followed by practical work; and interactive dialogues, exercises and tests.

In close collaboration with the above, the Mediterranean University Network on Sustainable Development (MedUnNet) has organised training workshops for junior university staff

on specific aspects of ESD, including concepts and methodologies.

The Global Regional Centres of Expertise (RCEs) play an important role in teacher training in the region. The UN University – established within the framework of the United Nations' Decade of Education for Sustainable Development (UNDESD) – supported the establishment of a global network of RCEs with the aim of enhancing and supporting ESD by "delivering trainers' training programmes and developing methodologies and learning materials for them". As part of this network, two RCEs were established in the EMME region: RCE Cairo in Egypt and RCE Crete, Greece (Global RCE Network, n.d.). Both have worked with many countries in the EMME region, including Cyprus, Egypt, Greece, Jordan and Lebanon, to train teachers and academics on integrating ESD and CCE into their teaching methods. These activities were organised under the umbrella of various international programmes, including TEMPUS (EduCamp, RUCAS, CLIMASP, etc.), Erasmus+ (CCSAFS, RefTeCp, etc.) and GIZ (EduCamp II and EduCamp III). All of these initiatives aim at collaborating nationally and internationally to raise the capacity of teachers and integrate ESD and CCE topics into national or regional curricula, educational programmes and institutions (Kostoulas-Makrakis and Makrakis, 2012; Ramzy, Kanbar and Eldahan, 2014; Sewilam, 2012).

8.2. Challenges

The main challenge to incorporating CCE into teachers' professional development stems from the weaknesses of supporting structures. Teacher development is typically provided through government-supported programmes or projects offered in universities, special academies, education departments, or other official training courses or centres, but such

training opportunities reach only a very small percentage of educators. In extremely rare cases in the EMME region, teachers may decide to seek training on their own, paying some fees, as they do in other parts of the world.

Various regional initiatives have been developed to train teachers on ESD and CCE (mostly in-service). However, these regional training programmes are limited and cannot adequately address the scarcity or lack of dedicated professional education programmes specifically addressing ESD and CCE.

Another obstacle stems from the behaviour of some trainees/educators, who do not pay sufficient attention or benefit enough from ad hoc trainings, which they do not view as essential to their careers. Some educators may also be disappointed by trainings, which fail to meet their expectations.

8.3. Gaps

Despite the creation of certain professional development programmes directly addressing ESD, these still represent only a small percentage of the overall professional development courses and programmes for teachers and are concentrated in just a few training agencies (e.g. the QRTA). As such, they do not have the required reach.

Various successful but relatively scarce regional (e.g. Mediterranean) initiatives for addressing teachers' professional development have not been replicated or fully utilised by the majority of the EMME countries. If it continues, this should be considered a missed opportunity to improve CCE in schools of the region.

8.4. Possible policies

The following policies could address CCE in teachers' professional development:

- Establish specific criteria and references to competences on ESD and CCE in teacher licensing and career development and promotion.

- Integrate basic ESD and CCE aspects in all professional training courses, not just in courses on sustainability. Provide incentives for teachers that receive additional training on ESD and CCE (e.g. through recognition of professional diplomas or certificates from training courses) that are considered for promotion.

- Fund scholarships in the EMME region for educators to follow professional development courses and further studies on CCE and ESD in other countries, thereby expanding the learning opportunities available to teachers in the EMME region.

"The professional development courses should promote the development of teachers' learning communities on climate change"

Climate Change | 9
in Technical
and Vocational
Education
and Training
(TVET)

9.1. Addressing climate change in TVET programmes

Technical and vocational education and training (TVET) is underdeveloped in the Middle East (Maclean and Fien, 2018), possibly contributing to the significant skill gaps for critical jobs and high levels of unemployment and underemployment in the region (WEF, 2017). This is especially relevant with regard to CCE and ESD in TVET, since the latter can be a useful sector in which to address the challenges of climate change. Yet this cannot be done without the necessary infrastructure and investment for high-quality TVET in general.

Several countries in the region continue to develop strategies and policies for TVET, often with support from the International Labour Organization (ILO) and other UN organisations. In Lebanon, for instance, the Ministry of Education and Higher Education, in collaboration with the ILO and United Nations Children's Fund, developed a National Strategic Framework for Technical Vocational Education and Training with the explicit aim to "contribute to inclusive and sustainable development, leaving no one behind". The TVET system is expected to promote principles of good citizenship, democracy and human rights, serving as a venue for constructive dialogue between individuals and communities and fostering social cohesion (MEHE, 2018). This emphasis may indicate stronger links between TVET and ESD.

TVET policies frequently focus on reskilling to enhance employability. A good example is the development of a guide on sustainability competences for green jobs in Cyprus that aims to help secondary and TVET students make decisions about their further education and career paths. The guide, developed through the YENESIS Project funded by the European Union, explains what a green job is and how a green job can secure students' futures as active members of society. It describes the horizontal skills green workers need and raises students' awareness about jobs they can pursue in fields related to climate change, such as renewable energy, energy efficiency, sustainable tourism and sustainable mobility (Iceland Liechtenstein Norway, n.d.).

TVET can play a significant role in serving and supporting marginalised communities. Joint government and NGO efforts can prove [test] TVET as a tool for economic and social development for post-conflict countries or districts and those in State building (or rebuilding) mode. In Palestine, for example, TVET focuses on improving the lives and livelihoods of the most vulnerable and marginalised, including through management of natural resources (notably water) and energy (Hilal, 2019).

In many countries, lack of relevant skills and technical knowledge is a key impediment to improving energy efficiency (Munshi, n.d.). A key aspect of renewable energy that distinguishes it from more conventional energy sources is its suitability for decentralised approaches. Any home or building owner can, if the law allows, install solar photovoltaic (PV) panels on their roof in order to reduce their carbon footprint as well as their electricity bill. As governments increase support for renewable energies as part of their mitigation efforts, demand for PV panels should create good-paying jobs for the specialised technicians needed to install them.

It is important to develop a symbiotic relationship between the aims of enhancing TVET and addressing CCE and ESD. TVET is increasingly seen as a helpful tool for combating climate change; CCE and ESD are increasingly used to enhance the quality of education in TVET settings and consequently employability (Majumdar, 2011). The UNESCO report On Greening TVET (UNESCO, 2017a) describes the transformative effect of implementing ESD in TVET education, noting that *"TVET plays an important role in helping make transitions to a low-carbon economy and climate-resilient society"*.

Kuwait has taken significant steps in including CCE in its TVET, through a focus on green jobs. For example, the Public Authority for Applied Education and Training has developed and offers degrees in environmental fields, including industrial hygiene and applied environmental sciences (EPA, 2019).

A TVET programme in Cyprus is competence based. The curriculum emphasises the acquisition of key competencies through a combination of theoretical teaching and practical training. Through practical training and job placement, students develop competencies in math, science and technology. They learn about technological products and procedures, including those related to climate change, equipping them to understand and evaluate the impact of science and technology (MoARDE and DOE, 2018).

9.2. Challenges

Lack of accreditation and standards are a common challenge in the region. In Saudi Arabia, for example, the Technical and Vocational Training Corporation has established more than 45 technical colleges and 64 vocational industrial institutes. But there is no national accreditation body to monitor the quality of these institutions or their adherence to national and international standards (Alzamil, 2014).

Another challenge is the fact that climate-related topics are sometimes presented in vague terms of little practical value. Israel, for example, made significant progress in improving TVET in the past several decades. But challenges remain connecting education and training to practical results (ETF, 2006).

In many cases, TVET graduates do not find relevant jobs; in some cases, they actually find it more difficult to be employed than the unskilled. Such challenges need to be examined and

considered before expanding TVET and including CCE and ESD in it.

9.3. Gaps

The identified gaps in TVET, particularly as they affect CCE programmes in several EMME countries, are connected to lack of frameworks and/or weaknesses in quality standards and accreditation of the various courses offered. Such courses provided by a multiplicity of state-supported or individual institutions frequently have poor relevance and connections to market needs and opportunities.

9.4. Possible policies

Policy makers could consider incorporating climate changes issues in TVET in the following ways:

- Increase support for the decentralisation and independence of TVET educational institutions across the region, in order to stimulate the development of more skills that directly address the needs of the relevant communities and productive sectors.

- Develop and promote TVET programmes aimed at future-oriented green careers, such as installation of PV panels, renovation and construction for enhancing energy efficiency, recycling of construction and demolition wastes and other materials, conservation of energy and natural resources, and reduction of pollution. Such development should focus on the quality of education and training and the operational links with market needs and opportunities. Courses based on unrealistic expectations are not likely to be effective.

- Increase the focus on agricultural TVET (ATVET) throughout the region, emphasising practices that reduce or sequester GHGs (e.g. organic and biodynamic agriculture) and reduce water use in irrigation by enhancing water efficiency through management of the water, energy, food, ecosystems nexus as major adaptation measures.

- Develop national and regional accreditation and quality standards for TVET institutions that directly and explicitly address ESD and CCE as key components of their programmes while respecting the independence and local context of each TVET institution.

- Increase financial, technical and legal support to TVET institutions in the region to develop programmes that address climate change and related environmental issues.

"It is important to develop a symbiotic relationship between the aims of enhancing TVET and addressing CCE and ESD"

Climate Change in Non-Formal and Informal Education

10

10.1. Addressing climate change through non-formal and informal education interventions

Previous sections have mentioned the role, character and target audiences of non-formal and informal education. Their importance is recognised at all levels from global to local. Their links with public participation and the opening of schools to society are well known. But the methods and tools they employ to accomplish their purposes are not very widely known.

Effecting meaningful change and achieving sustainable results require an approach that includes monitoring and following up education and awareness-raising programmes, with an emphasis on the evaluation of influential stakeholder groups such as decision makers and follow-up actions, particularly with reference to the most vulnerable groups, such as children, women and the elderly (ECIDSC, 2011). Such an approach yields a better understanding of impacts and can provide insight into which methods, tools, techniques and messages are most effective in affecting opinions and behaviours that affect climate change.

In Iraq, for instance, the main methods used to raise awareness about climate change were audio-visual tools and printed materials (MoE, 2013). Public participation and mobilisation were also key to addressing environmental issues such as oil spills (MoE, 2013).

Awareness campaigns have been widely used in the EMME region. In Kuwait, marine environment campaigns provided information on the impacts of climate change on marine ecology. Some of the campaigns focused on the dangers of coral bleaching due to acidification of marine waters caused by climate change (EPA, 2019).

Other countries have invested in increasing the impact and reach of informal education aimed at addressing climate change. In Israel, the Ministry of Energy's Office of the Chief Scientist provides scholarships for enhancing education on renewable energy, alternative fuels and other aspects of a low-carbon economy. Some of its programmes are directly aimed at *"implementing environmental education activities in informal education frameworks"* (MEP, 2018). Israel has an informal and non-formal education system that targets the general public as well as youth and adolescents at risk. Its networks are closely aligned and collaborate with NGOs and serve as key points for addressing climate change in informal settings (MEP, 2018).

To assess the efficiency of its energy strategy, which promotes renewable energies, the Ministry of Climate Change and Environment of the United Arab Emirates conducts annual environmental awareness surveys. The involvement of young people in these surveys is especially important, as about 30% of the population is under the age of 24.

At the core of different CCE and ESD initiatives is concern for the needs of vulnerable, less privileged groups, including youth, women, indigenous people, religious and ethnic minorities, refugees and other groups that are often left out of traditional decision-making processes and initiatives. Local communities are often addressed using tools and approaches similar to those described above, particularly when they have faced climate-change-related challenges, e.g. floods, droughts, forest fires, etc.

CSOs and environmental NGOs that are close to them have the tools and access to address these groups' needs and challenges. Recognising their importance, some EMME countries have included provisions in their national strategies and approaches for supporting NGOs/CSOs, particularly those addressing climate change through informal CCE and ESD.

The issues highlighted for awareness raising vary widely across and even within countries. Although climate change is a global phenomenon with global impacts, the most visible impacts are often very local. The focus therefore varies from country to country based on the issues that are considered most critical or relevant in the local context or for groups that are most at risk.

Oman, for instance, stated in its First Voluntary National Review that the country *"strongly believes that achieving the SDGs is contingent upon promoting the role of governorates and local communities throughout the development process"* and that *"it aims to consider the priorities and future aspirations of local communities in the drafting of the Vision document to enable all segments of society in the governorates, particularly youth, women, the private sector, and civil society organisations (CSOs), to actively participate in the sustainable development efforts exerted by the Sultanate"* (Supreme Council for Planning, 2019). Similar statements – emphasising the role of CSOs and NGOs, mentioning partnerships between governments and these organisations or highlighting the needs of minorities and vulnerable groups – are found in reports such as the Egyptian Sustainable Development Vision for 2030 (ECOM, 2017); the Lebanon Voluntary National Review on Sustainable Development Goals (Government of Lebanon, 2018); and the Kuwait Voluntary National Review (Government of Kuwait, 2019).

In its public awareness raising, Iraq – a country with a history of oil spills – prioritised the ecological harm caused by oil spills and ways to prevent them (MoE, 2013). This effort helped Iraqis understand the negative impact of activities contributing to climate change (e.g. petrol extraction and transformation) and built support for measures tackling these challenges. In contrast, Israel, a country with very limited access to clean, potable water, focused on raising awareness about reducing water usage, using water-saving devices, re-ducing water pollution, harvesting rainwater, reusing grey water, supporting technologies aimed at reducing water consumption and understanding the severity of water shortages (MEP, 2018).

Awareness-raising initiatives targeting specific groups are not limited to local issues. They often address general climate change, including both adaptation and mitigation strategies. In Israel, awareness raising has covered biodiversity, alternative fuels, global partnerships, heat-related illnesses, recycling, smart consumption and other issues. (MEP, 2018). In Egypt, awareness raising has focused on water scarcity; renewable and alternative energy; at-source waste separation; GHGs; the impacts of climate change on social, economic and health conditions; the transmission of diseases and other issues (EEAA, 2016).

10.2. Challenges

One of the most difficult challenges facing informal education about climate change is how best to address the general public. This is because climate change is a complex phenomenon spanning a range of different aspects not easily tackled using the methods of awareness raising frequently used in informal education (such as oral presentations in open-air spaces, etc.). It is often difficult for less experienced, informal educators to convey a proper understanding of the social and cultural impacts of climate change, or its related environment/ ecological aspects (e.g. rising sea levels, more frequent and severe droughts and other weather events) (Stubenvoll and Marquart, 2019).

Other difficulties are communicating a sense of urgency without resorting to alarmistic exaggerations, encouraging positive thinking and avoiding fatalism and superficial criticism of

others instead of critical thinking, solidarity and social mobilisation.

10.3. Gaps

Gaps in addressing CCE through informal and non-formal education include the following:

- Most efforts, however inspiring and successful in alerting citizens or specific target groups, have been non-systematic and haphazard. Their various aims and objectives have rarely been based on cohesive, targeted strategies. These deficiencies may reflect flexibility or rapid responses to emerging issues, but, in general, they do not ensure continuity, deeper comprehension of the issues and follow-up actions.

- Policy documents dealing with informal education mention monitoring and follow-up, but mechanisms and funding are rarely provided for either. The effectiveness of many of the educational interventions undertaken therefore remains unknown.

- Very few policies or strategies clearly distinguish between informal and non-formal education, even though each requires its own approaches and strategies. Most activities are carried out by governmental agencies/ministries or NGOs/CSOs. There is often a lack of co-operation between the two entities in designing or implementing interventions, even when dealing with the same issue or the same target group. Bridging this gap may help achieve better results.

- Further gaps (possibly major ones) emerge in devising strategies to address vulnerable groups, including indigenous peoples and minorities.

10.4. Possible policies

The following policies could help increase awareness of climate change:

- Develop concrete strategies to enhance and facilitate co-operation between government agencies and CSOs/NGOs for effective non-formal and informal CCE in schools.

- Craft and implement strategies and support mechanisms for stakeholder participation and engagement that include promotion of informal education and public awareness of climate change by different communities, target groups and society at large.

- Prepare (directly or indirectly) national registries of educational material on CCE, using data from relevant sources (academia, government agencies, CSOs and NGOs) that are available to all educators and interested parties involved in non-formal and informal education.

- Capitalise on relevant global and regional initiatives on non-formal and informal education as well as relevant educational networks.

- Enhance the use, exchange and adaptation of scientifically sound material and encourage synergies between relevant sectors and competent stakeholders.

Teaching Materials | 11

11.1. National and regional initiatives

In recent years, there has been a significant increase in the availability of teaching material for addressing ESD and CCE, both globally and within the EMME region. Countries, institutions, academics, and NGOs have developed manuals, guides, handbooks and other materials to help teachers address these topics. Lebanon's *Teacher's Guidebook on Climate Change*, for example, was developed in collaboration with the Ministry of Education and the United Nations Development Programme (MoE/UNDP, 2015).

A UNESCO-supported study on mapping the mainstreaming of ESD in Cyprus, Greece, Malta and Turkey found that Cyprus and Greece have *"quality criteria and guidelines for ESD-related teaching tools and materials that are supported by public authorities"*. Cyprus has guidelines that are also *"tested and recommended for selection by educational institutions"* (Goad, 2020).

Much of the material supporting ESD and CCE in both formal and non-formal education comes in the form of educational kits prepared by regional or national organisations and projects. The TEMPUS-funded project "Education for Sustainable Development Beyond the Campus" (EduCamp) developed material on ESD for the Egyptian educational system. It provides methods, activities and lessons to teach students about water, energy, biodiversity, agriculture and sustainable development (Sewilam, 2012, 2014a, 2014b; Sewilam et al., 2015). The kits included 200 interdisciplinary activities *"linking the existing curricula to the surrounding community, providing a series of non-formal ESD interventions ranging from innovative group work, field trips, discussions, experiments, games, and research work"* (Sewilam et al., 2015).

The MEdIES has prepared its own kits, as well as guidebooks, educational posters and games, on sustainable development issues such as water, solid waste, separation at source, sustainable consumption and production, Mediterranean food, marine litter, plastics, single-use plastics and other topics. Many kits link interventions to the school curriculum, allowing teachers to find an activity, game or instructional method that connects with the subject matter they planned to teach. These materials are available in several languages, often including Arabic. Prepared by high-level academics and educators, usually from several countries, they can be downloaded for free. They primarily support the 6000-member network of ESD educators, which anyone can join for free. Most of the MEdIES/MIO-ECSDE educational material includes provisions for teacher training/capacity building, often supported by EU and UN funds/projects such as:

1. Horizon 2020 Capacity Building / Mediterranean Environment Programme (MIO-ECSDE/MEdIES, 2011, 2012a, b, 2013a,b, 2014, 2015, 2016).

2. Sustainable Water Integrated Management-Horizon 2020 (MIO-ECSDE/MEdIES, 2018). The capacity building activities were frequently combined with inter-institutional consultations to better coordinate ESD initiatives and the stakeholders of each country. Representatives of the ministries of education, environment, sustainable development, water and youth, among others, engaged actively in these meetings. (The reports of all the meetings in Algeria, Jordan, Palestine and Tunisia can be found by following the hyperlinks.)

3. Water and Environment Support in the ENI Southern Neighbourhood Region (MIO-ECSDE/MEdIES, 2021, 2022), in which material is presented to educators at the national level, together with full information on the best use of the kits.

The limitation of this approach is the relatively small number of educators that can be reached directly. To increase reach, in co-operation with ministries of education and environment, key individual educators from each governorate or district of all EU neighbourhood countries (Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine, Tunisia) were invited to participate and act as "multipliers" of their experience. More than half of these individuals shared what they learned with other educators, according to the monitoring and assessments of the aforementioned EU projects.

Another way of reaching out is through MIO-ECSDE members from various countries, who translate and reproduce material for national or local needs, using resources and means raised locally.

One such case was the translation into Turkish of the kit "Water in the Mediterranean" by Green Steps, a MIO-ECSDE NGO. Green Steps promoted and disseminated 20,000 copies of the kit to public schools in Turkey.

As governments in the region increasingly recognise the importance of teaching material in integrating CCE into their education systems, they have adopted different approaches. In Cyprus, the Education for Environment and Sustainable Development Unit of the Ministry of Education, Culture, Sports and Youth is mandated to write and produce educational material on the SDGs (UNESCO, n.d.[a]). The unit is set up as a horizontal structure within the ministry, serving departments and units that undertake activities on sustainable development, ESD and CCE.

MEdIES/MIO-ECSDE organises most activities at the Mediterranean level. At the EMME regional level, collaborations are taking place through UNESCO's regional offices, some of which support the development of material on ESD and CCE. UNESCO Doha and the Oman National Commission hosted a

workshop in Jeddah on education for sustainable development in the GCC. It aimed *"to present the Oman guidelines on green schools initiative and discuss the common trends and issues to come up with GCC guidelines for ESD and green schools"*. The workshop presented an opportunity to discuss the possibility of establishing a GCC guidebook for green schools, establish a reference guidebook on green schools and suggest recommendations for addressing critical challenges facing ESD, including developing material (Doha, 2017).

The Regional Bureau for Science and Culture in Europe, based in Venice, has been very active in supporting ESD, particularly as it concerns youth activities and non-formal education in the MAB (Man and the Biosphere)/UNESCO Biosphere Reserves. Together, MIO-ECSDE and the UNESCO Chair of the University of Athens on Sustainable Management and Education in the Mediterranean prepared a guidebook entitled *ESD in Biosphere Reserves and other Designated Areas* (UNESCO, 2013). It is used widely in the EMME region, the entire Mediterranean and throughout the world, supporting education communities, schools and related stakeholders in their interventions. The material is used at the annual regional summer universities organised by these institutions on management of ESD.

In Oman, the private sector has played an important role in ESD and CCE. Private companies have contributed to the educational materials and training provided by the Ministry of Higher Education. They have also supported sustainable development activities, including training programmes, learning resources and materials for low-income students (Mulà and Tilbury, 2011).

International companies have also financed valuable educational material. The Coca Cola Foundation supported the kit on non-conventional water resources prepared by Global Wa-

ter Partnership–Mediterranean (GWP-Med) in cooperation with MIO-ECSDE (Scoullos et al, 2012).

11.2. Challenges

Comprehensive, interdisciplinary material on CCE is lacking in the region, partly because many educators are not fluent in English or French, the languages of most internationally available material. One way of expanding the reach of CCE is to translate material into other languages, notably Arabic. In addition, many students in the region have limited access to electronic media.

A wealth of material produced by UN bodies, countries, universities, NGOs and private firms is available on the Internet and could be inventoried (accompanied by URLs and information on permissions and copyrights) and/or translated. A small multinational group of authors could be formed to produce a regional school textbook on CCE, to be translated by countries at their own cost.

"Advancing CCE and its goals requires a deeper dive on the existing efforts and policies towards ESD"

Research | 12

12.1. Few statistics and general considerations

While research on climate change is rapidly expanding at all levels, research on CCE remains quite limited, and this is even more the case within the EMME region. It should thus be noted that when searching for the term "climate change education" within various research databases, significantly limited results were obtained compared to more well-established topics such as climate change in general in ESD. This large disparity can be seen in Table 1.

This is expected since CCE as a field is very recent and many papers with significant CCE elements are still classified by their authors under more general ESD headings. A systematic review of CCE involving rigorous review and filtration found only 49 papers that directly addressed the topic (Monroe et al., 2019).

However, for a new field, the number of publications does not fully reflect yet the relevant volume of (new) research, which definitely exists but is scattered across the various topics and subfields of CCE covered. This section focuses on reviewing some of the most critical and important studies conducted on CCE in the region and highlights the results obtained.

Table 2 presents a non-comprehensive list of a sample of papers and research articles directly addressing CCE from different perspectives and provides a flavour of the relevant research themes tackled.

TABLE 1

Search Results for "Climate Change Education", "Education for Sustainable Development" and "Climate Change" in major Research Databases

Database	Climate change education	Education for sustainable development	Climate change
Emerald Insight	74	1 000+	14 000+
Taylor and Francis	406	1 775	90 003
Science Direct	159	1 061	271 714
Sage Publications	86	648	27 757

Note: Some results for ESD may also include the results for CCE.

TABLE 2

Summary of Research Literature on Climate Change Education, 2013 - 21

Manuscript	Year	Type of education	Topic
Climate Change Education for Mitigation and Adaptation (Anderson, 2013).	2013	Formal and non-formal	Factors influencing skills, attitudes and behaviour changes from CCE
GREENIFY: A Real-World Action Game for Climate Change Education (Lee et al., 2013).	2013	Non-formal and informal	Implementing and assessing a pilot study on an application of CCE
Climate Change Education as an Integral Part of the United Nations Framework Convention on Climate Change (Secretariat of the United Nations Framework Convention on Climate Change, 2013)	2013	Formal, non-formal and informal	CCE at the United Nations
Warming to the Idea: University Students' Knowledge and Attitudes about Climate Change (Wachholz, Artz and Chene, 2014)	2014	Formal	Knowledge of climate change among university students
Middle and High School Students' Conceptions of Climate Change Mitigation and Adaptation Strategies (Bofferding and Kloser, 2014)	2014	Informal	Identifying attitudes and knowledge of school students towards climate change solutions
Climate Change Education in the Context of Education for Sustainable Development: Rationale and Principles (Mochizuki and Bryan, 2015)	2015	Formal, non-formal and informal	Role of CCE in addressing sustainability
Recent Trends in National Policy on Education for Sustainable Development and Climate Change Education (L ss e and Mochizuki, 2015)	2015	Non-formal	Trends of ESD and CCE
Assessing Elementary Science Methods Students' Understanding about Global Climate Change (Lambert, Lindgren and Bleicher, 2011)	2017	Informal	Assessing knowledge about climate change during an instructional intervention embedded in an elementary science methods course
Broadening Epistemologies and Methodologies in Climate Change Education Research (Busch, Henderson and Stevenson, 2019)	2019	Formal, non-formal and informal	Concepts of CCE

Key Questions about Climate Change Education and Research: "Essences" and "Fragrances" (Reid, 2019)	2019	Formal, non-formal and informal	Reviewing and addressing concepts of CCE
Pre-Service Teachers' Opinions about a Two-Day Climate Change Education Workshop (Betül, 2019)	2019	Non-formal	Increasing awareness of pre-service teachers about the role of forests in adapting and mitigating the effects of climate change
Public Support for Carbon Taxation in Turkey: Drivers and Barriers (Uyduranoglu and Ozturk, 2020)	2020	Informal and non-formal	Identifying educational methods that impact support for addressing climate change
The Unique Role of Medical Students in Catalysing Climate Change Education (Rabin, Laney and Philipsborn, 2020)	2020	Formal	Integrating CCE in medical education
A Capacity Needs Assessment to Integrate MOOC-Based Climate Change Education with the Higher Education Institutions in Europe and Developing Countries in Asia: Findings of the Focused Group Survey in PCHEI under the BECK Project (Senevirathne et al., 2021)	2021	Informal	Methods of addressing CCE through MOOCs
Using the SDGs for Global Citizenship Education: Definitions, Challenges, and Opportunities (Leite, 2021)	2021	Formal	Mainstreaming education for global citizenship, sustainable development and climate change into national curricula
Assessment of Knowledge, Attitudes, and Practices (KAP) towards Climate Change Education (CCE) among Lower Secondary Teachers in Tehran, Iran (Karami et al., 2017)	2017	Formal secondary education	Assessment of teachers' levels of knowledge, attitudes and practices towards CCE
Turkish Pre-Service Science Teachers' Awareness, Beliefs, Values, and Behaviours Pertinent to Climate Change (Higde, Oztekin and Sahin, 2017)	2017	Informal	Examining Turkish pre-service science teachers' awareness, uncertainty beliefs, values and behaviours pertinent to climate change
Public Support for Carbon Taxation in Turkey: Drivers and Barriers (Uyduranoglu and Ozturk, 2020)	2020	Informal and non-formal	Identifying educational methods that impact support for addressing climate change

Results of research projects and many research papers are also presented at conferences. Conferences have become a major source of disseminating knowledge on environmental education/ESD/CCE and on climate change in general. In several cases, papers on climate change include recommendations on CCE and particularly on the importance of supplementary measures for adaptation to climate change with educational and public awareness campaigns, etc., without getting deeper on this topic. The results of the latest research on the topic of CCE in the region are usually reported in two different types of conferences related to (1) education issues and (2) climate change issues. Research on environmental education in the region (now called ESD or CCE) was presented as early as 1997, at the Thessaloniki "International Conference of UNESCO on Environment and Society: Education and Public Awareness for Sustainability" and published in monumental proceedings of 900 pages. Since then, obviously much more has been produced.

Similarly, among dozens of conferences on climate change, it is noteworthy that the First International Conference on Indian Ocean Tropical Cyclones and Climate Change was organised in the EMME region, in Oman, in 2009 by the Sultan Qaboos University (Ahmed and Choudri, 2012).

12.2. Summary of key themes and research projects carried out

It is not possible to carry out a comprehensive review of the research that has been done on CCE in the region because only a few studies have been provided by the countries that commissioned them and they are not otherwise accessible. A preliminary evaluation of their findings seems to provide rather limited information for the present report. However, from the approaches followed and the spirit of this research we can conclude that recent CCE research papers in the EMME:

1. Examine students' background knowledge of climate change and its causes and impacts, across various educational stages.

2. Study the views of students in specific grades (6–12) on actions that can help to reduce global warming (Freije, Hussain and Salman, 2016); report on the design and application of environmental programmes (e.g. in Bahrain's eco-schools) or of awareness-raising campaigns and other educational interventions (Freije, Hussain and Salman, 2016).

3. Report on comparative studies on the CCE situation in various countries and make relevant recommendations on education curricula.

4. Assess the impacts of various CCE interventions and initiatives.

5. Examine impacts of short-term educational interventions on knowledge about climate change.

6. Assess the knowledge and attitudes of university students regarding global warming in the region.

7. Assess the effectiveness of CCE (Ledley, Rooney-Varga and Niepold, 2017) or teaching methodologies to enhance skills in collecting data and inputs concerning the credibility of information.

8. Review the type of CCE research carried out by post-graduate students, on both natural (physicochemical) and human science aspects (National Research Council, 2010).

9. Examine how CCE is being delivered through social studies, language and arts and what the "human links" are with climate change (Siegner and Stapert, 2019).

10. Assess simulation and role-playing educational interventions suggested by "Climate Interactive" and find that they are successful in enhancing students' abilities to learn and react positively to climate change issues (Rooney-Varga et al., 2018) across the political spectrum.

11. Assess green schools' performance in promoting alternative (solar) cooling systems with significant energy saving (Dakheel, Aoul and Hassan, 2018).

12.3. Challenges in promoting research on climate change education and some proposals to address them

As already mentioned, research in CCE and more generally on ESD is governed by two approaches. The first is a purely educational one, based on pedagogies and methodologies for inspiring and influencing behavioural changes and attitudes towards a better environment and a safer world. The second is based on science, and may include complementary analyses of socio-ecological and cultural dimensions. Worldwide, balancing these approaches in a single research project is a major challenge. Planning for ESD and CCE in the EMME region must take into account the actual conditions of educational establishments and overall educational policy frameworks. This, in turn, necessarily involves collaboration with teachers, students and schools, and the overcoming of both technical and institutional obstacles.

A report of the US National Research Council entitled "Informing an Effective Response to Climate Change" (National Research Council, 2010) concludes that research in communicating and teaching about climate change and climate decisions is difficult. GHGs are invisible, there is a time gap between climate impacts and GHG emissions, and the approaches and frameworks that people use to study climate change and related concerns are various. Also, the response is necessarily multifaceted, involving a wide range of strategies and disciplines, e.g. actions to control GHG emissions, decrease possible damages from climate change impacts, and improve low-carbon choices for the national and global economy, etc. (National Research Council, 2010).

In response to the above challenges, international evidence-based research indicates that the following steps can enhance learning about climate change:

- Use integrated, cross-discipline curricula and engage in sustained, constructive learning experiences.

- Engage students in active learning and local problem solving.

- Focus on each person's ability (and responsibility) to achieve positive outcomes.

- Prepare teachers' curricula (both pre-service and in-service), which are fundamental for delivering high-quality CCE (Anderson, 2013).

Regional Co-Operation | 13

13.1. A mandate for climate change education

The necessary global response to climate change extends beyond national boundaries and includes regional co-operation in many forms and across fields. Education is an essential element of this response. It helps not only students but all people and society at large to understand and address the impacts of climate change. It encourages changes in their perceptions and helps them to develop attitudes and to adopt behaviours that will help the world mitigate and adapt to climate change. Hence, the UNFCCC urges countries to facilitate climate change research and education at regional (in addition to national) levels and continuously highlights the importance of cross-national co-operation between all parties involved (UN, 1992).

Agenda 2030 and the relevant SDGs clearly point to the need for ESD and emphasis on CCE, while the regional bodies active in the EMME region have formally recognised the critical importance of promoting ESD and public awareness on climate change (see under 13.2).

13.2. Building mechanisms for climate change education

Various co-operation mechanisms have been established by countries in the EMME region. They include bilateral and multilateral co-operation agreements, joint intragovernmental committees, regional research and policy centres and other co-operation schemes.

Among the most important multilateral co-operation institutions for addressing climate change is the Arab Centre for

Climate Change Policies (ACCCP,) established by the UN Economic and Social Commission for Western Asia (ESCWA, 2018a). The ACCCP has the explicit purpose of supporting Arab states in addressing climate change through a multitude of approaches including the provision of access to knowledge products and to regional data and information using the Regional Knowledge Hub (ESCWA, 2018b). The ACCCP also works with the LAS in order to build capacities and provide technical and advisory support for addressing the challenges of climate change. This initiative does not address CCE per se but it is critical for the development of relevant adaptation and mitigation strategies, including educational ones (IISD, 2018).

Another major regional co-operation initiative also focusing on the Arab States is the Arab Climate Resilience Initiative (ACRI) which was established by the Regional Bureau for Arab States of the UNDP (ACRI, n.d.). The ACRI was set up in recognition of the need for *"mainstreaming adaptation both into national and regional development plans; and promotion of research and education"* (Elasha, 2010). Its main focus is multinational co-operation among Arab states as well as regional stakeholders in an attempt to foster a collective approach and response to climate change in the region using every tool available, including general education, ESD and CCE.

Other initiatives focus on co-operation in addressing climate change by considering the importance of geopolitical and geographical synergies. The UfM is an important intergovernmental Euro-Mediterranean organisation which includes nine economies of the EMME, namely: Cyprus, Egypt, Greece, Israel, Jordan, Lebanon, Palestine, Syria and Turkey (UfM, n.d.). It also includes all EU and Mediterranean economies, bringing together 42 countries in all. Of the UfM's various areas of co-operation, climate change is a critical one, placed under the Council of the UfM Ministers of Environment and Climate Change and their Regional Conferences, where poli-

cies are adopted. In 2014, this Council adopted the Mediterranean Strategy of ESD in a declaration, and the UfM Secretariat was asked to regularly report on the topic (UfM, 2014b). In the new UfM Declaration of Cairo (4 October 2021), emphasis was given to enhancing awareness and understanding of climate change and environmental degradation through appropriate education programmes. The goal is to accelerate civic engagement and behavioural and lifestyle changes already initiated by younger generations and to further promote consumer awareness.

Another major Mediterranean organisation (actually the only UN entity with headquarters in the Mediterranean region), which brings all Mediterranean EMME countries together, is the UNEP/Mediterranean Action Plan (UNEP/MAP). Based in Athens, with a galaxy of regional activity centres (RACs) spread throughout the Mediterranean, it focuses on the environmental protection of the Mediterranean region. The UNEP/MAP Secretariat also facilitates the Mediterranean Commission of Sustainable Development, where apart from the Mediterranean member states, stakeholders from all sectors (local authorities, private sector, IGOs, NGOs and academia) participate on an equal footing. Although initially, neither climate change nor ESD were among the core of activities of UNEP/MAP, recently it has become involved in adaptation approaches in coastal areas as well as in ESD through its active participation in the MCESD and by recognising ESD as one of its "flagship" initiatives.

In collaboration with the Massachusetts Institute of Technology, the Dubai Centre of Excellence for Creative Energy and Water Solutions and the Solar Innovation Centre under Sheikh Mohammed bin Rashid al Maktoum Solar Park in Dubai, the United Arab Emirates has invested heavily in a graduate education programme for sustainable energy growth and in building the Masdar Institute for Science and Technology. In addition, the United Arab Emirates has developed a local, na-

tional and regional climate change assessment programme that contributes to addressing data challenges in climate change adaptation and vulnerability issues across the wider region (United Arab Emirates, 2015).

Similarly, the Alexandria Research Centre for Adaptation to Climate Change was established with the support of the International Development Research Centre in Canada. This centre seeks to raise the capacities of researchers to better study and tackle climate change and its impacts on the region. A new master's programme was developed on climate change and sustainable development as a way to support the centre's capacity in training, CCE and research (ARCA, 2017).

The United Nations also plays a critical role in addressing sustainability issues and climate change in the region. Recently, a new four-year MoU was signed between the UNEP and the UNDP, which aims to *"accelerate the implementation of the 2030 Sustainable Development Agenda and particularly the Environmental Sustainable Development Goal"* in Iraq (UNEP, 2020). This is in addition to the critical role that the United Nations plays in supporting the signatories of the Paris Agreement (which include all of the countries of the EMME region) in addressing climate change.

Perhaps the most specialised body established for the collaborative promotion of ESD (and CCE) in the Mediterranean region is the Mediterranean Committee on Education for Sustainable Development. The body supervises the MSESD and its action plan, agreed upon by the UfM Ministerial Meeting of Ministers of Environment and Climate Change (2014), the COP of the Barcelona Convention (2016) and the Mediterranean Ministers of Education (2016). Among its many other achievements, the MSESD established commitments of the various Mediterranean Member States to co-operate on education for sustainable development, contributing to the strengthening and improvement of ESD in their countries and

"help to ensure mutual understanding, strengthen trust and develop respect for cultural values, thereby building friendly relations between peoples and nations and contributing to peace and wellbeing" (UfM, 2016).

13.3. Educational institutions' participation in activities and networks related to climate change education

In line with the overall aims and policies of the various EMME countries, several educational institutions have undertaken a leading role in promoting CCE as well as in participating in various networks, projects and initiatives aimed at addressing climate change through ESD and CCE. Erasmus+ (and previously the TEMPUS Program), which is managed under the Education, Audio-visual and Culture Executive Agency, has been one of the most important programmes, especially under KA2 for Capacity Building for Higher Education. Many universities in the region (particularly within the European neighbourhood) have benefited from grants and from implementing projects which provided knowledge and capacity building to universities and other HEIs in sustainability and climate change.

A considerable number of recent projects address climate change and CCE. Universities from Greece, Egypt, Jordan and Lebanon were involved in a TEMPUS-funded project entitled "Reorient University Curricula to Address Sustainability" which focused on introducing general sustainability and ESD concepts into the curricula of partner universities (Holland et al., 2013). Another project with the same participants, entitled "Development of an Interdisciplinary Program in Climate Change and Sustainability Policy", approached CCE in a multidisciplinary manner. Its main scope was to produce approved teaching courses related to climate change and CCE at different faculties of the partner universities (MEdIES, n.d.). A further outcome was the establishment of a Euro-Arab Center for Integrative Studies in Climate Change.

The Cyprus Institute is an example of an HEI being developed mainly for regional co-operation in addressing sustainable development and climate change. Since its inception, the Institute has convened and hosted various initiatives aimed at addressing climate change such as an international conference on climate change in the Mediterranean and Middle East (Makri, 2018). Furthermore, the Institute helped to establish the Cyprus Chapter of the UN Sustainable Development Solutions Network (SDSN Cyprus). The SDSN is active in other countries of the region, aiming to work closely with all relevant stakeholders as well as the United Nations and funding agencies in order to promote its work addressing sustainable development and climate change, including through educational activities, mostly in universities (Strüber, 2020).

Other examples can be found in Kuwait. As part of its initiatives towards addressing climate change, the Kuwait Institute for Scientific Research (which was designed by the International Atomic Energy Agency, IAEA, as an IAEA Collaboration Centre) is expected to further research and teaching on the carbon cycle and other sources of climate change (Couture, 2019). The Kuwait Foundation for the Advancement of Sciences (KFAS), meanwhile, has made significant progress in addressing climate change and CCE at the regional level. KFAS is a non-profit private foundation led by H.H. the Emir of Kuwait and it has the mandate "to operate towards the benefit of Kuwait society, for stimulating, catalysing, and enhancing science, technology and innovation". KFAS supports pilots in scientific research, capacity building and technology financing. In this framework, an international conference on the impacts of climate change on the coast and the marine

environment was organised in 2017, which focused on the rising of the sea level. KFAS also sponsored the creation of air pollutant standards through the Kuwait Pollution Inventory Framework.

Also in Kuwait, the International Global Learning and Observations for Benefit of the Environment (GLOBE) programme was initiated in an informal manner by the Ministry of Education with support from the US State Department (KFAS, 2018). This non-formal education programme helps students and the general public understand the Earth system, the global environment in general and climate change in particular. GLOBE offers interdisciplinary, grade-level climate, biosphere, hydrosphere and soil/pedosphere studies, developed and validated by the scientific community and addressing students, teachers, scientists and people from all parts of the world and the region to learn through realistic science about their own local areas.

13.4. Regional bodies and funding mechanisms

Within the framework of the LAS the Arab Forum for Environment and Development (AFED) establishes transboundary co-operation among the states of the LAS supporting environmental education, documentaries, internships and fellowships (AFED, 2021b).

AFED also developed the "Environmental Guide for Arab Schools" in order to achieve the goals of sustainable development including climate action. This guide focuses on the documented information and reports produced by Arab international organisations on issues relevant to the environment. All its activities were revised and organised by environmental education experts (AFED, 2021a).

The Arab Permanent Committee on Meteorology (APCM) was established in 1970 under the umbrella of LAS in order to provide support regarding the meteorological aspects that may contribute in reducing the impacts of severe climate events (UN, 2021). One of the effective meetings that took place within APCM and in co-operation with the World Meteorological Organization (WMO) was the Arab Regional Climate Outlook Forum (Cairo, 2018) to discuss institutional, financial and technical aspects of climate change in the Arab States (WMO, 2021). A main outcome of the forum was the creation of a dedicated Arab Climate Outlook Forum website including a regional knowledge hub for assessing the impact of climate change on water resources (WMO, 2021).

In the realm of clean energy (GRC, 2021), the Gulf Research Centre of the United Arab Emirates and the Institute of Communications and Computer Systems of the National Technical University of Athens, and other partners have introduced new technology applications in the field of renewable energy (GRC, 2021).

13.5. Challenges

Just as there have been many different initiatives for regional co-operation on CCE, there are still significant obstacles to deepening this co-operation and effectively capitalising upon the significant results already achieved.

One of the major challenges in addressing climate change and CCE is due to the variability in the aims, goals, standards and regulations that apply across the region on both climate and education issues.

Of the few organisations that encompass all EMME countries, several global UN bodies focus on education (e.g. UNESCO)

and others on the climate (UNEP, WMO, etc). Otherwise, the EMME countries follow typically various guidelines, standards and regional or national approaches that may or may not be compatible.

For example, Greece and Cyprus, being part of the European Union, have their educational systems developed and accredited according to EU standards and follow EU systems such as the Bologna Process (EHEA, 2015a, 2015b). Some other EMME countries voluntarily follow compatible norms. However, most of the countries of the region either follow different regional systems or have developed, to different degrees, their own national education systems, mechanisms and standards.

As mentioned earlier in this chapter, Cyprus, Egypt, Greece, Israel, Jordan, Lebanon, Palestine, Syria and Turkey participate in the UfM and the Mediterranean Committee for ESD. In the latter, the most important relevant international bodies active in the region – namely, UNESCO, UNEP/MAP, UNECE, LAS and UfM – also participate and have adopted through both their ministries of education and environment a relevant strategy and action plan prioritising CCE. The committee is currently chaired by Cyprus while the facilitation of the secretariat is entrusted to scientific aspects, to the UNESCO Chair and Network on Sustainable Development Management and Education of the University of Athens and to MIO-ECSDE/MEdIES for its administrative and operational aspects (UfM, 2014b).

The co-operative activities undertaken within this framework include training educators on various ESD issues that are carried out in all member countries, as supported by EU-funded projects (UfM, 2014b).

Some of the other important regional initiatives include the GCC members Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

The LAS also includes a large group of countries, but it does not include the non-Arab ones (such as Cyprus, Greece, Iran, Israel and Turkey). To find ways to bring these country groupings together is a challenge.

However, perhaps the most fundamental challenge related to CCE in the region is the difficulty involved in agreeing on commitments or setting relevant targets, particularly on climate change, even within the separate existing groups. Notably, although *"most existing regional cooperative efforts are focusing on adaptation, to date, the Arab region does not have yet a shared, aspirational GHG target, nor does it have regional regulations or guidelines to achieve such target"* (Al-Sarihi and Luomi, 2018). For overall co-operation, the conditions in the Middle East are even more difficult than a few years ago, with no signs of rapid or substantial improvement. Obviously, this situation does not help in easily shaping a regional approach to CCE.

13.6. Prospects for regional co-operation on climate change education

Despite the aforementioned challenges and major obstacles, it should be stressed that the individual countries of the region have not been left behind in the relevant UN efforts and there have been significant successes in the region as a result of global co-operation towards addressing climate change and achieving a more sustainable future. With Syria joining the Paris Climate Agreement in 2017, every country in the region has formally signed on to this ambitious initiative (Nichols, 2017). Additionally, all of the countries have committed to achieving the UN SDGs including SDG 13 on climate change and SDG 4 on education. They have also supported relevant initiatives such as the UN Decade for Education for Sustainable Development (2005-14) and the Global Action

Programme on Education for Sustainable (2015-19) as well as subregional commitments mentioned before. It is clear that, despite the major political difficulties the region experiences, there is genuine will and interest among all the EMME countries to find appropriate modes and channels of co-operation and synergies in addressing the critical, common, challenges of climate change.

Co-operation is possible at three levels:

- Among ministries of the EMME countries, focused on declared national initiatives and commitments towards the United Nations (e.g. UNESCO and Agenda 2050/SDGs).

- Among networks of governmental environmental education centres, focused on raising public awareness.

- Facilitation of interactions among NGOs, CSOs and academic institutions working on CCE throughout the region.

This three-level approach may also be leveraged for educators' professional development in ESD/CCE, involving eventually any relevant national unions or associations that might exist (Zachariou and Korfiatis, 2020).

The educational initiative of the EMME countries invited by Cyprus under the Cyprus Climate Initiative will capitalise on the above-mentioned assets and prospects and encourage co-operation among all countries in ESD and CCE for the benefit of current and future generations.

13.7. Possible policies

Previous chapters analysed various aspects of the development of CCE at different levels and key conditions, initiatives and prospects in the EMME region. The value of these analy-ses is not in the details but in an overall understanding, on the one hand of the prevailing conditions and needs at the regional level, and, on the other, of how the policy landscape is being formulated for CCE. This understanding will in turn help in addressing current and emerging issues at the appropriate policy level.

The Government of Cyprus seeks opportunities to establish and/or enhance synergies and co-operation among the countries of the EMME on education. The goal – to facilitate and strengthen common efforts among countries and peoples to effectively tackle climate change and its impacts in the region – is undoubtedly a noble one, urgently needed. At the same time, it should be admitted that its implementation, though in essence quite feasible, is not expected to be easy.

Progress towards this goal is urgently needed because the EMME region is, according to all models and predictions, the "hottest" spot for climate change worldwide, with severe impacts (frequent extreme heat waves, water scarcity, extended droughts, devastating forest fires, unprecedented floods, rapid intrusion of alien species, loss of biodiversity) already visible. These phenomena call for solidarity in the design of systematic and efficient multilateral policies, measures and plans that go beyond national borders and, most importantly, willingness, ability and resources for implementing them. Such an approach is needed among all countries of the world, according to the Paris Agreement, but also the recommendations of all Rio Conventions (for climate change, desertification and biodiversity) and, of course, the Agenda 2030 and the relevant SDGs.

Preparing for the future, the region's countries will have to do most of the work needed to ensure successful co-operation. As has been noted, the challenges are substantial: political tensions and armed conflicts, and a sequence of economic crises in countries and the region with direct and indirect

FIGURE 5

Range of Co-Operation Options on CCE in the Region

Current situation

Best scenario of improved cooperation

Worst scenario of reduced cooperation
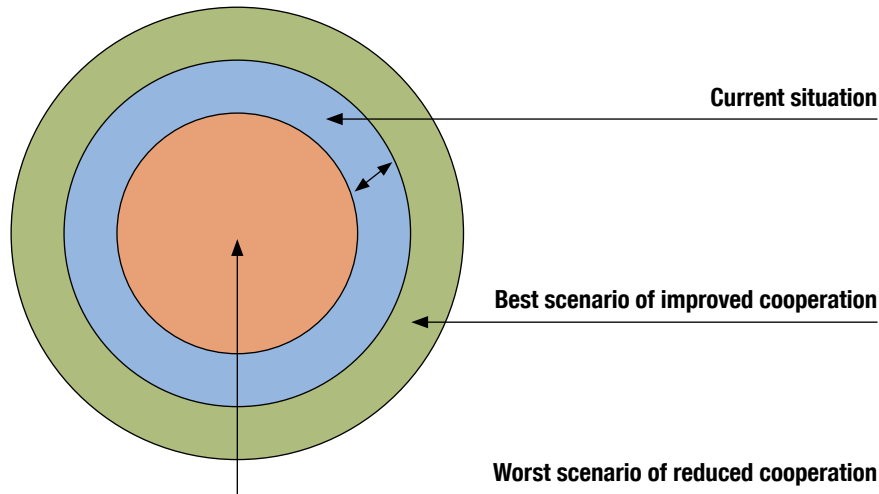
impacts – including refugee flows – spreading throughout it. It is therefore important, first, to consider which plans are realistic within the political landscape. Figure 5 summarises possible scenarios. One is an absolute minimum level of co-operation (brown core), if conditions become less favourable. The blue zone represents a scenario based on the current situation. From here, the prospects of enhanced co-operation may be considered, along with the next steps to take towards a relatively more ambitious scenario.

Figure 6 visualises the transition from national to regional EMME policies and initiatives, with the achievements of subregional groups of countries possibly serving as stepping-stones. The subregional groups may suggest good practices worthy of further testing for replication by other subregions and/or individual EMME countries.

13.8. Strategic orientations for collaboration on climate change education in the region

As is the case with all other bodies and schemes involved in the promotion of ESD at the global, regional and national levels, common decisions and recommendations have the character of suggested guidelines and are not legal, compulsory regulatory norms.

This allows collective progress but excludes any type of penalisation, while it aims at "pulling" those that are left behind for whatever reason. At the same time, it does not prevent forerunners from moving ahead faster and beyond any

FIGURE 6

Subregional Initiatives as Stepping Stones from National to Regional CCE Policies
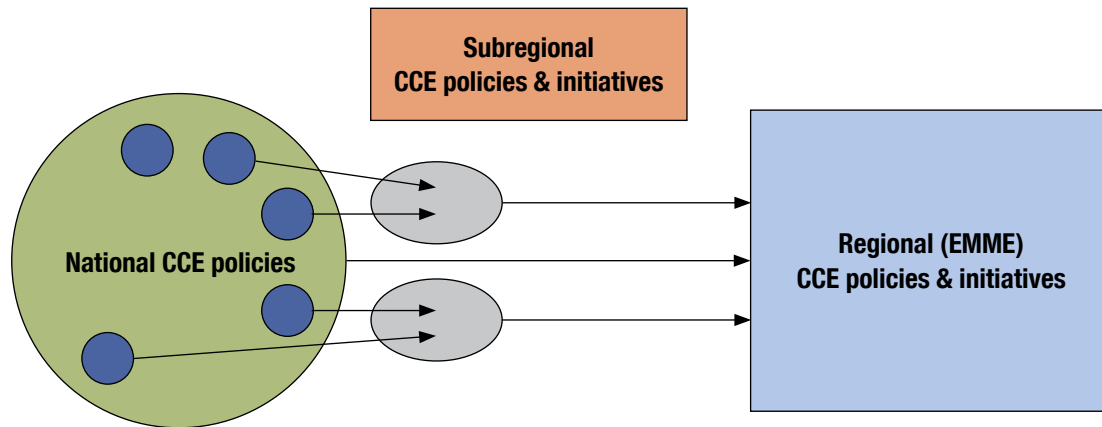
"agreed" positions of the bulk of countries. This is the system of "elastic boundaries" that was suggested for certain types of European co-operation back in 1992 (Scoullos, 1992).

In the scheme shown in Figure 7, progress is made when most countries move ahead of the "common denominator" demonstratively faster (even if only slightly) than if they had to move alone. This system may be a slight burden for the forerunners, who, however, usually have the benefit of showing the way and the moral pride of leadership.

As for those that may delay, there are two options:

• If for political or other reasons one or more parties decide not to follow, they are "tolerated", in the hopes that their obstacles will be overcome and they will fully join the group later. In parallel, it is understood and accepted that although voluntary participation is usually/largely governed by consensus, there is no "veto" approach for anybody to inhibit the majority to move ahead.

• If a delay is due to objective difficulties, solidarity is expected to be demonstrated through assistance to ensure that no one is left behind.

Obviously, there is an operational connection between the CCE initiative and task force and the overall Cyprus Climate Initiative in the EMME region.

In other words, the first decision that may be needed is on the preferred strategic orientation and the related options ahead:

FIGURE 7

Exploiting "Elastic Boundaries" to Encourage Progress on CCE in the Region

Slow or independently moving ones   **Bulk of the countries**   **Forerunners**
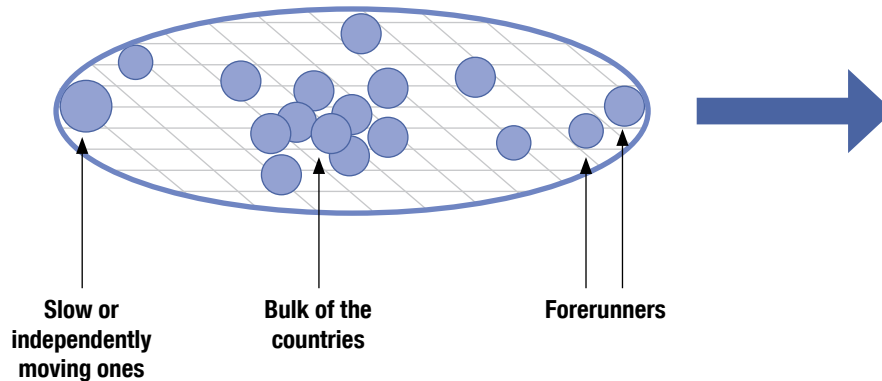
The first strategic orientation concerns the level of "autonomy" of the CCE task force in relation to the overall CCI. There are two options proposed under this orientation, one of which should be selected, without excluding other options to be elaborated as well.

Option 1: CCE efforts are taken in pace with the progress of the overall Initiative and whatever general provisions might be agreed therein.

Option 2: The EMME countries agree that the CCE task force may move somewhat independently or even faster, in a more "light" and "flexible" way, than other components of the Climate Change Initiative which are more political, more technical or more expensive.

If option 2 is selected, **a second strategic orientation should be followed, which would involve a common roadmap** to be clearly understood and easy to be followed by all, without creating unnecessarily heavy or costly structure and bureaucracy – safeguarding, in parallel, transparency,

fair play and accountability, and avoiding at any cost pitfalls and obstacles resulting from misunderstandings or lack of clear communication.

For **the second strategic orientation**, there could be three alternative ways to start moving forward:

1. To start by prioritising identified gaps and recommendations to overcome them first at the national and eventually at the regional level.
2. To start with an agreed vision for turning what is considered one of the most turbulent and vulnerable regions of the world into a "pioneer" region, focusing on ESD and CCE to promote progress among the region's youth, academics, and other vital stakeholders – and society as a whole – towards a more secure future.
3. To start by agreeing on a "facilitating" structure to co-ordinate action for the promotion of CCE and mobilise the necessary involvement of countries and other stakeholders, and eventually financing for programmes, projects and joint activities.

A fourth option is to combine the above, based on the choice made under the first strategic orientation and the level of interest, commitment and ambition of the EMME countries.

13.9. Modest proposal for moving forward

A realistic approach would be to start small and gradually expand, as efforts gain the full confidence and support of all the EMME countries and the CCE community of the EMME region. The degree of support to be expected will depend largely on the usefulness, efficiency, early successes and political prudence of related efforts.

Therefore, the following are proposed:

- The CCE task force for EMME fully benefits from the overall efforts of the Climate Change Initiative but maintains some operational autonomy in order to secure optimum possible conditions for the sustainability and continuity of the initiative, under whatever circumstances.

- A CCE/ESD committee/task force is established with representation from each country of the EMME and eventually a number of associated regional bodies having the status of observers or advisory roles (e.g. the MCESD). The committee could appoint a provisional presidium and may be supported at first by a small "provisional" secretariat.

- A brief vision paper stating the scope, ambitions and a general action plan for CCE in the EMME is agreed among the countries as a guiding document for CCE development at the country and regional level.

It is important that key directions of national and regional ac-

tions address the introduction of CCE in curricula at various educational levels in each country, as well as define an appropriate framework to support non-formal and informal CCE, promote suitable educational methodologies and tools, and enhance multidisciplinary and multilateral co-operation on all aspects of CCE including relevant research at all levels.

"The global response to climate change extends beyond national boundaries and includes regional co-operation, bilateral and multilateral agreements joined, intragovernmental committees, regional research, policy centres and other collaboration schemes"

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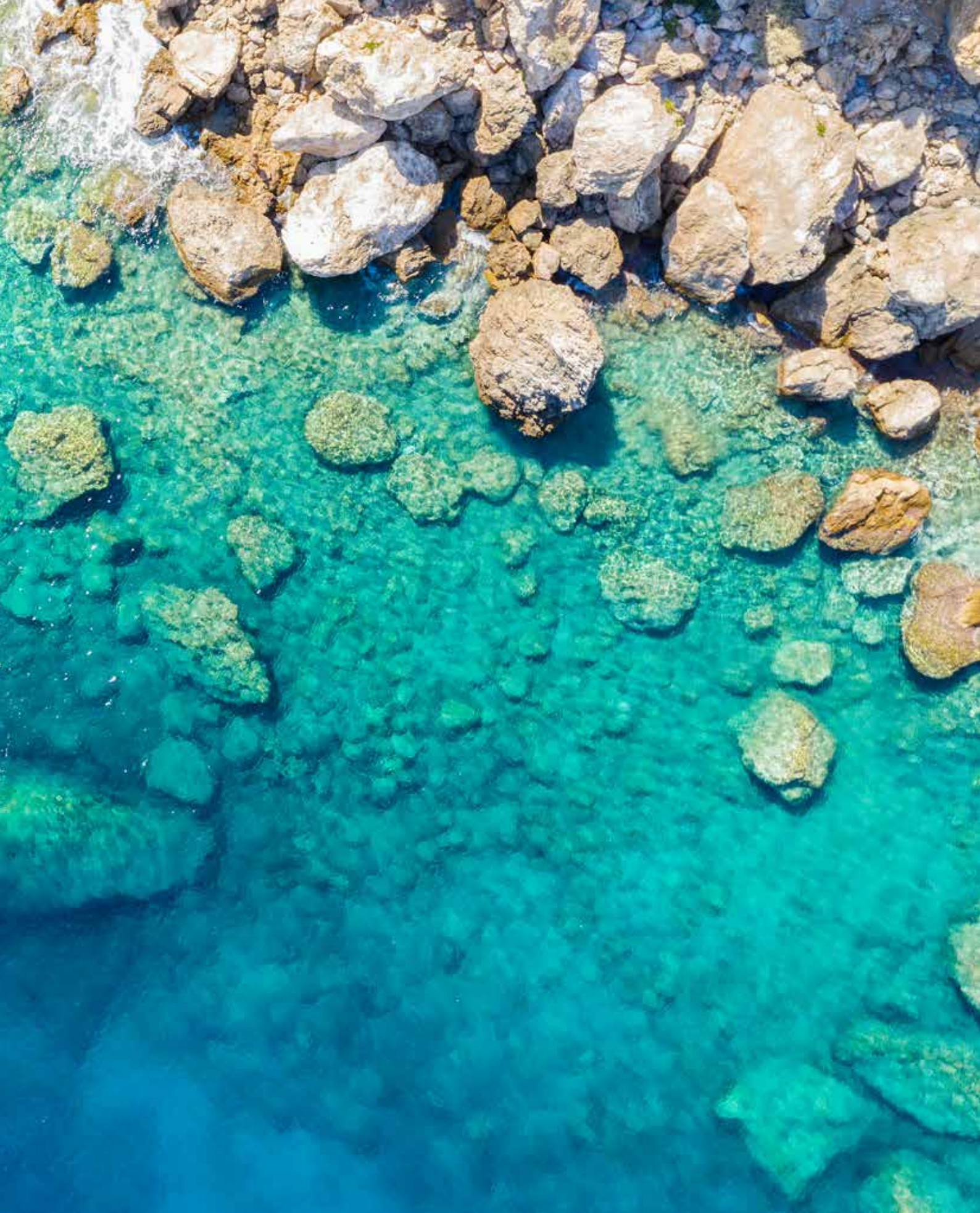
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The Eastern Mediterranean and Middle East (EMME) region is a hot-spot of climate change. The urgently needed implementation of mitigation and adaptation measures to address climate change cannot be effective without wide public understanding and support, particularly by the young. Education and public awareness on climate change, conventionally termed "climate change education" (CCE), reaching not only school children but the society at large, is of utmost importance for securing the enabling environment for informing, convincing and involving key policy makers and leaders – while mobilising all stakeholders for the needed transformation.

The aim of this work is to identify the trends, commonalities and gaps of CCE in the EMME region and to help the countries of the region to develop synergies and collaborate to accelerate and integrate CCE into their educational policies and systems.

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