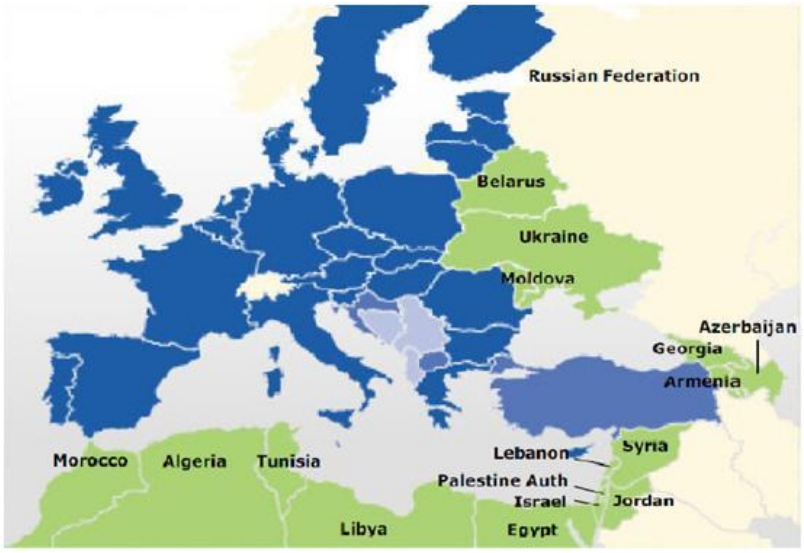
ANALYSIS FOR EUROPEAN NEIGHBOURHOOD POLICY (ENP) COUNTRIES AND THE RUSSIAN FEDERATION ON SOCIAL AND ECONOMIC BENEFITS OF ENHANCED ENVIRONMENTAL PROTECTION

REGIONAL SYNTHESIS REPORT: ENPI South

Synthesis report on: Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, occupied Palestinian territory, Syria and Tunisia

Executive Summary



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EXECUTIVE SUMMARY

This is the executive summary of a regional synthesis report which has been prepared within the project '*Analysis for European Neighbourhood Policy (ENP) Countries and the Russian Federation on social and economic benefits of enhanced environmental protection*', initiated and supported by the European Commission's EuropeAid. This synthesis report was developed by the Institute for European Environmental Policy (IEEP), together with ARCADIS Belgium N.V. (project leader), Ecologic Institute, Environmental Resources Management Ltd (ERM), Metroeconomica Ltd and several independent experts.

The project covers the 17 partner countries: the countries covered by the European Neighbourhood Policy (ENP) and the Russian Federation (see Box 1). This synthesis report illustrates a range of environmental issues which are important in the region or in specific countries within the region. It highlights the most significant benefits and the environmental improvements that need particular attention and collaboration between the European Union (EU) and the ENP areas, and between the countries themselves. This executive summary of the regional synthesis report provides a summary of the specific country benefit assessment reports for: **Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, occupied Palestinian territory (OPT), Syria and Tunisia** (hereafter referred to as 'ENPI South' or as Southern partner countries)[1].

The country benefit assessments have been conducted by teams consisting of an EU expert and a national expert, using a Benefit Assessment Manual developed under this project. The Benefit Assessment Manual, which was originally for internal use, has been turned into a Benefit Assessment Manual (BAM) for policy makers and experts for wider dissemination and provides an understanding of the methodologies applied for the country benefit assessments.

All project results, including the country benefit assessment reports, the regional synthesis reports for ENPI East and South, for which this is the executive summary, and the Benefit Assessment Manual, are planned to be published on the project website www.environment-benefits.eu and to become available upon request, from the European Commission's EuropeAid, DEVCO F3, Regional Programmes Neighbourhood East.

The value of improving environmental conditions for people, society and the economies, of improving environmental infrastructures, of safeguarding biodiversity and wider natural assets (our natural capital) is far larger than many realise. In many cases improving the environment can help save money, avoid costs, often avoid important health impacts and improve welfare and also provide confidence in the role of the state. Taking account of these values can help in decision making and governance during this period of economic crisis, of social unrest, in this turning point on the road to a green economy.

[1] The benefit assessment for Libya had to be cancelled due to the political situation in the country and the country is therefore not covered in this synthesis report.

These are times of change and there are major opportunities in improving the environment that will lead to synergies in policy objectives and help with jobs, livelihoods, savings, security (water, energy, natural hazards and food security) and health.

Box 1 The European Neighbourhood Policy (ENP)

The European Neighbourhood Policy (ENP) was initiated in 2004, with the objective of strengthening the prosperity, stability and security of the EU and its neighbours. It consists of bilateral policies between the EU and 16 partner countries: Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Israel, Jordan, Lebanon, Libya, Moldova, Morocco, occupied Palestinian territory, Syria, Tunisia and Ukraine. A strategic agreement was also signed with Russia – the Strategic Partnership with the Russian Federation.

From 1 January 2007 the European Neighbourhood Policy and Strategic Partnership with the Russian Federation have been financed through a single instrument - the European Neighbourhood and Partnership Instrument (ENPI), which was designed to target sustainable development and approximation to EU policies and standards. In May 2011 the two joint Communications: '*A partnership for democracy and shared prosperity with the Southern Mediterranean*' and '*A new response to a changing Neighbourhood*' (EC, 2011a,b) were published, with a renewed commitment to cooperation with the states in the ENPI region. The aim was to strengthen individual and regional relationships between the EU and the partner countries by making additional funds available in exchange for more mutual accountability. Sustainable development –and environment - was one of the areas in which there was a strong commitment to make progress, as shown for example by the following extracts:

- The EU will join up efforts with its neighbours on **climate change** by enhanced co-operation to address low-carbon development and improve resilience to climate impacts (**adaptation**), The EU and partner countries should also pursue a higher level of the development of new partnerships on renewable energy sources and energy efficiency, and nuclear safety.
- Extending the Energy Community Treaty to neighbours not yet party to it or, building on its experience, establishing a complementary 'EU-Southern Mediterranean Energy Community' aimed at enforcing higher standards of **air** and **water quality**, improved environmental **governance**, higher **resource efficiency**, protection of **biodiversity and ecosystems** and supporting the necessary **infrastructure investments**.
- To support sustainable development, implementation of existing regional agreements such as the Barcelona Convention for the Protection of the Marine Environment and Coastal Region of the Mediterranean should be given greater priority.

This benefit assessment aims to offer an evidence base to support the on-going dialogues and cooperation.

The aim of this project was to develop a first cross ENPI assessment to illustrate the scale of the potential benefits for the countries of addressing environmental challenges. This was to help raise awareness of the benefits and provide an evidence based assessments on benefits to help those ministries and other actors wishing to take measures to improve the environment and help in the transition to a resource efficient, green, equitable economy. The aim was also to facilitate and encourage similar valuation exercises in the countries, whether at the national or local level, on a range of issues of particular interest to the nations (see Box 2).

Box 2 Aims of the Benefit Assessments

The Benefit Assessments (BA) that have been conducted under this project, intend to help the partner countries evaluate the benefits of addressing environmental challenges they are facing, and in this way, assist policymakers by providing new evidence and values on:

- the key environmental issues affecting their country, i.e. the issues that could result in the greatest benefits if tackled appropriately;
- the impacts of these issues on society – i.e. in terms of social (e.g., health), economic (e.g., additional financial costs) and environmental (e.g., biodiversity loss) impacts;
- the benefits (health, environmental, economic, social) to society that can be achieved by taking action to protect the environment.

The assessments provide 'order of magnitude' results, in order to communicate the scale and significance of the potential benefits of tackling the issues and illustrate the value of benefit assessments to support policies. Common ENPI wide targets to be met by 2020 have been used, to have a common basis to assess and illustrate the benefits. Clearly countries do not have the same policy aims, nor indeed do they have the same 'starting points', capacities, opportunities and ambitions for progressing and implementing environmental policy agendas. In some cases existing political commitments will match those used as the basis of the analysis here, and in other cases the ENPI wide targets might be too ambitious or in other not ambitious enough.

The objective therefore has not been to do an assessment of country policies, or 'judge performance or plans', and it is clear that many countries have made considerable efforts in recent years that may not be picked up in the analysis. Similarly, a range of countries have recently launched important strategies and plans to improve the environment or realise opportunities (e.g. renewable energies). The results in this study should be seen as offering evidence to support the commitment to these initiatives and naturally not as a statement that nothing is being done, as that is generally not the case. Clearly, the fact that this study had to rely on common targets from Marrakesh to Murmansk, while allowing a common setting across countries, underlines the need to see the results as a useful first estimate to illustrate the benefits, and encourage countries to explore further those issues where progress is possible on the near term policy agendas. In this regard, under this project, a benefit assessment methodology has been developed, that can be adapted more concretely to national circumstances.

The results of the benefit assessments conducted under this project have the potential to be of value to a wide range of stakeholders. (see Box 3).

For specific questions complementary analysis fine tuned to the specific needs would be warranted – e.g. cities looking into land use planning decisions to traffic, green infrastructure investment, for land use classifications in an around the city (e.g. forests for water; areas for recreation, areas for protection and areas for habitation and industrial zones), or ministries looking into the likely benefits of a specific policy proposal would use different targets and probably also variation of baseline assumptions to allow due sensitivity analysis to fully understand the potential benefits.

Box 3 Organisations that can make use of benefit assessments	
Organisation	**Potential use of Benefit Assessments**
Governmental institutions, responsible for a sector that will directly benefit from environmental improvements	Governmental institutions, responsible for a sector that will directly benefit from environmental improvements, such as ministries responsible for environment, water, energy, land use, agriculture, fisheries, health (in particular interested in the health benefits, such as avoided illnesses), labour, social affairs (in particular interested in the benefits related to jobs, poverty and rural livelihoods) and tourism. This report provides evidence of the benefits of environmental improvements that can support their arguments for implementing and funding environmental actions and for environmental policy integration.
Governmental institutions that decide on allocation of funds	Institutions, for example ministries of finance, that play an important role in deciding the funding levels for each other ministry, are also a potential user of benefit assessments. This is important, as it is the perceived benefits that drive policy decisions to allocate public resources to maintain and to improve the quality of the environment. Benefit assessments provide evidence of potential economic savings resulting from environmental improvements.
Regional and local authorities	For similar reasons as the above mentioned governmental institutions.
Parliament	The benefit assessment reports can help legislators responsible for environmental matters to make the case for better environmental protection and conservation legislation.
The Judiciary (ministries of Justice); Environmental inspectorates/enforcement agencies	The benefit assessment reports provide evidence that supports their arguments for enforcing environmental legislation.
Local communities	The benefit assessment reports can help communities that depend for their livelihood on natural resources (e.g., forestry, fisheries) to demonstrate the value of the resources and the importance of preserving them, community management of community resources.
The private sector, civil society and the development partner community	The benefit assessment reports can help these stakeholders which jointly work on the common challenge of the transition to a resource efficient, effective, green and equitable economy, to set priorities for action. They also provide them with evidence when advocating for enhanced environmental protection.

As each country is characterised by its own economic, political and social conditions, and as the basic data used in these analyses are not always comparable across countries, one should not compare/benchmark countries against one another and the benefits calculated here should be seen in their context. Similarly the regional totals should be seen as illustrative estimates. What the exact value will be, will depend on national choices on the paths to a green economy.[2] Box 4 provides guidance on the interpretation of the benefits that have been calculated under this project.

[2] Countries also have a range of specific interests not just in the fields covered in this report, but more widely (e.g., energy efficiency, desertification, chemicals), or needs for particular depth on issues covered here (e.g. jobs, rural livelihoods and poverty; or natural capital and tourism). Not everything could be covered by the

Box 4 Interpreting the benefits expressed in monetary values

In interpreting the results expressed in monetary terms, it is worth bearing in mind that these are derived from a **mix of market and non-market values**. The market values will directly affect GDP (e.g. capturing the value of improved agricultural output). There are other effects – such as a reduced risk of suffering from chronic bronchitis – for which no market prices exist, and so do not affect GDP, but which people value. These values can be estimated through various methods and are used to present benefit estimate results in monetary terms in order to help communicate the importance of the issues.

Furthermore, where values relate to benefits related to international process (i.e. carbon prices used as regards climate change mitigation) the values are in Euros, and where they relate to e.g. health benefits associated with avoided impacts of air pollution, or other benefits, they are in € PPP (**Purchasing Power Parity**). PPPs are widely used as an alternative to monetary exchange rates when making international economic comparisons. They are, in effect, 'real' exchange rates, based on a comparison of the relative purchasing power of each country's currency. Purchasing power parities equate the purchasing power of different currencies. This means that a given sum of money, when converted into different currencies at the PPP rates, will buy the same basket of goods and services in all countries, thus eliminating differences in retail price levels between countries.

The range of **carbon values** used in this project derives from different sources. For an assessment of avoided damage, the marginal value of damage from a tonne of carbon can be used and is a non-market value obtained from modelling the marginal change to the aggregate impacts of climate change in monetary terms as a result of the additional tonne of carbon emitted. Alternatively, for the assessment of costs of action to reduce carbon emissions, national marginal costs of emission reductions can be used, or if trading markets exist, then a Clean Development Mechanism (CDM) or trading price could be used (e.g. EU-emission trading scheme (ETS) price), to the extent that there is market access. This selection of values can quickly get complicated by the range of estimates available, and some countries have offered guidance values. Broadly speaking, these guidance values present marginal damage cost estimates that are higher than the costs of national action. Whether these latter cost estimates are higher or lower than the given market prices depends on the strictness of the emission targets/objectives and potential for action in both the domestic domain and in the carbon markets. In all cases the values will change over time.

Finally, those values relating to **wellbeing and human health** (e.g. avoided bronchitis, diarrhoea or early mortality from polluted air or water), have been applied using a conventional benefits transfer approach. In this approach, a value derived in one country (e.g. the willingness to pay to avoid bronchitis) is 'weighted' by the relative GDP/capita between the country from where the value was derived and the 'target' country, in this study one of the partner countries. While this is acceptable at one level – peoples' willingness to pay for clean drinking water does tend to be broadly related to income levels (and the GDP/capita is a proxy for this), for health this is sometimes regarded as controversial - most notably with regard to the **value of avoiding early mortality** from pollution.

In this case, this approach can lead to the interpretation that lives in countries with lower GDP/capita

existing study, and this should not be taken as a study judgement as to whether something is important or not - all environmental issues merit attention and it is a question of data, resources and tools. There is a growing discipline of benefit assessment and even in difficult areas (e.g. chemicals) which should become increasingly accessible for benefit assessment in due course.

Box 4 Interpreting the benefits expressed in monetary values

are in some sense not valued as highly as those in countries with higher GDP/capita. To avoid this complication, it is best, ideally, to use national willingness to pay estimates of 'values of prevented fatality'. Where these are not available, the conventional benefits transfer approach with weighting may be used, noting clearly - to avoid misinterpretation - the caveat that the transferred estimate is an approximation, only, of the preferences of the citizens in the target country.

Alternatively, where income levels between the original country and the target country are not too disparate, it is defensible (from an economic perspective) to use the original value, unadjusted by weighting given the substantial uncertainties still remaining in the empirical estimation of such values. It is also of course defensible (from a moral perspective) to have no GDP/capita weighting. In either case, care must be taken to be transparent as to the method and assumptions and not to confuse the instrumental benefit of an economic assessment (highlighting that lives should be protected) with the unintended consequence following from the misinterpretation of 'value of lives varying across nations' (where 'traditional' GDP/capita weighting is applied).

As a final cautionary note, it is likely to be the case in practice that if no assessment is done, the risk of losing lives is higher since the health effect may be under-valued in a policy appraisal. So whilst if valuations are used (as they are here) then one faces the controversy, the potential to save lives arguably merits the controversy.

Benefits synthesis: Key Messages

Key Messages

Key messages from the work on the benefits of improving the environment in the Southern partner countries in the areas of air, water, waste, nature and climate change, are summarised below.

Key Messages: Air

1. Air quality is currently a significant environmental hazard across the Southern partner countries, in particular in urban centres, where most of the industries and vehicles are concentrated, resulting in sizeable negative impacts on public health, ecosystems, crops and materials. In Morocco for example, most of the industries are located in the Casablanca region.
2. Principal benefits resulting from reduced emission levels of a range of pollutants include: improvements in human health (pulmonary and cardiovascular illness); higher crop yields, (nine crops including potatoes, barley and wheat), and; reduced soiling of building materials. Air pollution impacts on ecosystems and cultural heritage would also be reduced as a result of lower emissions.
3. Total emission reductions of SO_2, NOx, PM, NMVOCs and NH_3 by 50 per cent from projected 2020 levels in all the Southern partner countries are presented in Table 1.

Table 1 Air pollutant emission reductions in the Southern partner countries (thousand tonnes)

NH_3	NMVOC	NOx	PM_{10}	SO_2
377	1574	776	731	1322

4. As a result of these emission reductions, the total quantified benefits realised domestically as a result of each country's reductions could be as much as €32 billion (in PPP) per year, of which 60 per cent of these benefits – the largest in absolute terms - would be made within Egypt, as a result of the emission reductions in that country. The numbers of premature deaths and cases of chronic bronchitis that could be avoided annually rises up to between 19,000 – 60,000 and 36,000 – 117,000 respectively by 2020.
5. According to the indicative estimates made here, a further doubling of benefits could be realised in 2020 if changes in impacts that result outside national borders as a result of domestic reductions were also considered. Benefits to human health are estimated to account for around 90 per cent of all the quantified benefits, due to reductions in incidence of respiratory and cardio-pulmonary illnesses.
6. These results therefore suggest that – as being initiated in many of these countries – future regulation should address both stationary and non-stationary sources and consider technological options as well as spatial planning.
7. Air quality strategies are likely to be more cost-efficient if they are designed to exploit synergies that exist with climate change policies that regulate greenhouse gas emissions.

Such synergies should therefore be recognised in the design of national and regional environmental policies.

Key Messages: Water

8. Provision of a centralised piped drinking water supply varies across the Southern partner countries. For urban populations, the highest levels of provision are found in Israel, Egypt and Lebanon and the lowest are in Algeria and the OPT. For rural areas, there is more variation between the Southern partner countries. In Israel almost all rural populations are connected, but in some countries connection rates are low, such as in Algeria and Syria. In Morocco, the share of the rural population that uses improved drinking water sources has hardly increased over the past decades, though progress is being made recently.
9. The level of household connection to the sewage network also varies. In some urban areas this can be relatively high, such as in Israel, Algeria and Syria, but some urban populations are not well connected. For instance in the peri-urban areas of Morocco's main cities, about 2 million Moroccans have no access to water supply and/or sanitation services. For rural populations the degree of connection to sewage networks is much more diverse, ranging from 100 per cent connection in Israel, to only 4 per cent in Jordan. Many of the poorest people remain without any form of sanitation. These deficiencies directly affect people's health and their ability to engage in income-generating activities—or, for children, to attend school
10. Information on the status of hygiene practices is generally not available in most countries. However, substantial improvements in hygiene practices can be achieved in most countries with substantial reduction in diarrheal disease and transmission of respiratory infections.
11. Meeting targets of full connection to piped drinking water and sewage collection would mean an additional 45 million people would have reliable and safe piped water to premises, and an additional 92-106 million people would have connection to a sewage network system in 2020.
12. Overall, across the region, the benefits that would accrue from improved drinking water quality, sewage connection, and improved hygiene practices would be between 45 million and 100 million annual cases of diarrhoea avoided and between 4,350 and 9,500 deaths avoided in 2020.
13. The annual monetised benefits that would accrue from improved drinking water quality and sewage connection and improved hygiene practices would be between €2,1 billion and €4.7 billion for morbidity, between €1.7 billion and €3.7 billion for mortality, which would give total annual benefits of between €3.8 billion and €8.4 billion. These benefits represent between 0.06 per cent and 0.99 per cent of the individual countries' GDP in 2020. These values are in € PPP.
14. Wastewater treatment varies across the Southern partner countries, but in many cases treatment plants are often lacking, but in Israel, where there is extensive provision of the service. In some countries sewage is often released directly into the rivers, the sea or on the soil. Improving levels of treatment would reduce pollution of surface waters with

benefits for ecosystems and for health through reduction in contamination of drinking water sources and recreational bathing areas.

15. Surface water quality varies, with many water courses suffering from pollution, often from old or inadequate wastewater treatment infrastructure, sewage discharges, industrial pollution, and agro-chemical run-offs. Improving this would bring significant benefits for residents and users, such as farmers, fishermen, and property values, etc.
16. The benefits of meeting water quality improvements vary between €31 and €240 per household (in PPP) per year, which corresponds to 0.10-0.86 per cent of the GDP of individual countries in 2020.
17. Water scarcity is a serious problem across Southern partner countries, given the arid climate and limited water resources. A number of countries, such as Jordan and Syria, have already reached peak renewable water resources, and Egypt is already classify as 'water poor'. Droughts cause significant economic damage and forced rural migration. Better water management, that should precede any water supply augmentation, would bring additional economic, as well as social and environmental benefits.

Key Messages: Waste

18. Key waste-related issues include: increasing waste generation (with the improving living standard), a poor waste management policy, lack of cost recovery policies and thus of sufficient funding, lack of technical expertise, insufficient cooperation between municipalities, inefficient and partial collection, inappropriate waste disposal (no sanitary landfills), and a low level of public awareness (evidenced e.g. by widespread littering on beaches) and limited involvement of the private sector (e.g. lack of Extended Producer Responsibility).
19. Municipal waste collection coverage is an issue in most Southern partner countries. Only Israel and Lebanon succeed in reaching full or nearly full waste collection coverage, especially in rural areas. Better coverage would avoid wild tipping, unmanaged dumpsites, waste burying and burning, and their related impacts on health and environment. Jobs can be created as well as more viable living conditions.
20. A shift from dumpsites to well managed sanitary landfills, including the rehabilitation of abandoned quarries used for waste disposal, would have a considerable environmental impact. Sanitary landfills avoid nuisance, odour, fires and smoke (often with dioxin emissions), runoff water impact, soil water impact and health risks (from methane emissions and from waste scavenging).
21. Lack or poor separate waste collection reduces the opportunities for recycling in several countries, and central composting facilities often do not exist. As a result, in most of the country analysed only a minor fraction of the collected municipal solid waste is being recycled. In several countries (e.g. Egypt, Morocco) the informal recycling sector recovers valuable waste items before collection or at the landfill sites. It is estimated for example that in Morocco (2008) about 3,500 waste-pickers, 10 per cent of which are children, are living on and around the 300 uncontrolled dumpsites, and open dumpsites. Waste pickers inclusion initiatives are now being taken in some of the main cities.

22. Recycling would avoid the remaining landfill impacts, generates jobs and makes material resources available for the industry. Sorting at source and adapted collection systems are the first condition to reach high quality recycling. The present informal recycling sector can be professionalised and its activities can grow considerably

23. Back yard composting and centralised capital extensive (windrow) composting of source separated material are a good solutions to divert biodegradable waste from landfills, and they create a valuable material to fight soil degradation.

24. Biodegrading waste cause the production of methane, a strong greenhouse gas, which escapes from landfills and dumpsites. Avoiding these emissions through enhancing collection coverage and diverting biodegradable waste from dumpsites and landfills is the first and major measure to take when addressing greenhouse mitigation measures in the field of waste policy.

25. Complementary methane can be captured on well equipped landfill sites. Captured landfill gas can be flared (oxidising methane to CO_2 and reducing its impact with a factor 25), or it can be used to generate electricity or to be distributed as natural gas. Calculable and monetisable benefit assessments can be made on: surface of avoided dumpsites, amounts of supplementary collected municipal solid waste, amounts of supplementary composted or recycled waste, jobs created for collection and waste treatment, overall value of supplementary sound waste management, based on WTP, and marketable values of avoided CO_2 eq. emissions. This first ENPI wide assessment (using ENPI wide common targets) give the following indicative order of magnitude estimates of the benefits:

    - Enhanced waste coverage will likely lead to significant avoidance of polluted land – this first ENPI South wide estimate suggests that this could be in the order of a 100 thousand m^2 for the OPT to 350,000 in Jordan to millions of m^2 in other countries - 2 million m^2 in Morocco, 3.4 million m^2 in Algeria and around 7.5 million m^2 in Egypt.

    - Increased waste treatment by expanding collection coverage and sanitary landfill capacity could avoid around 35.6 million tonnes of unsanitary waste dumping, lead to 13 million tonnes of additional waste recycled or composted and eight thousand additional jobs generated in the region for landfill, recycling and composting.

    - Overall around 34 million more people could benefit from increased waste collection coverage under the target, leading to around €1.5 billion (PPP) benefits per year for the region.

    - There are considerable potential benefits from improved waste management also for climate mitigation. Over the region around 5.5 billion m^3 of methane could be avoided per year, with a value of around €5.3 billion per year from 2020.

26. Through improved waste management national and local authorities can have great potential influence on improving the quality of public health (e.g. by improving collection and treatment), conserve natural resources (through increased recycling) and mitigate climate change (through methane capture). This would require a change of existing waste practices and the implementation of strategies aiming at waste prevention, separate collection, recycling, composting and waste treatment before final disposal. Improved waste management will generate jobs and income, with recycling generating considerably more jobs than landfilling or incineration.

Key Messages: Nature

Biodiversity is of immense intrinsic value and human well being depends upon it. It is the 'natural capital' that provides a country, its economy and its people with a flow of goods and services that are fundamentally important for prosperity, livelihoods and well-being. The values we receive from our natural capital are immense, and failure to adequately take these values into account in our decisions exposes us to the risk of losing yet more of it.

Biodiversity in the region

27. The status of biodiversity is poorly known in much of the region, but it is clear that there is on-going degradation of most ecosystems, and many associated species are declining. Consequently a substantial number of species are threatened nationally, some of which are at risk of global extinction.
28. The main threats to biodiversity in the region include: overgrazing, cutting of forest and shrublands for firewood (leading to desertification), fires, expansion of agricultural land and agricultural intensification, population growth and rapid urbanisation (combined with poor planning), wetland drainage, pollution, illegal hunting and overexploitation of some species, especially fish, and the spread of invasive species.
29. One of the principal means of protecting biodiversity (and associated natural capital) is through the protection of areas of very high biodiversity that are at risk of degradation. This is recognised by the Convention on Biological Diversity (CBD), which has set a target of achieving at least 17 per cent protected area coverage of terrestrial and inland water bodies, and 10 per cent of marine areas, by 2020. Although it is difficult to obtain consistent and up-to-date data on protected area coverage (due to differing national interpretations of protected area definitions, and on-going protected area expansion), it is clear that the achievement of the CBD target would substantially increase the protection of biodiversity within most countries in the region.
30. Only Israel and Algeria currently have protected areas that exceed the CBD coverage target, whilst Egypt is close to the target and aims to reach it by 2017. The achievement of the CBD target would result in significant increases in protected area coverage, and associated biodiversity and ecosystem service benefits, in Jordan, Lebanon, Morocco, the OPT, Syria and Tunisia.

31. The status of marine protected areas in the region could not be reliably deduced from existing data for this study, but in general marine areas are poorly represented in the protected areas network. It appears that further protection of marine habitats is also required in most countries.

32. It must be remembered that protected area coverage is a crude measure of biodiversity conservation effectiveness, as the strength of protection and appropriateness of land and marine management measures within protected areas is of key importance. In this respect it is clear that considerable improvements could be made in the designation of protected areas and in the effectiveness of protected area management in the region.

33. There is considerable uncertainty over the potential ecosystem service related benefits of increasing protected area coverage in the region. However, the assessments indicate that the most important benefits of increasing protected area coverage in the region are likely to be related to the protection of carbon reserves, the improvement of raw water resources in terms of quality and quantity (through better protection and management of vegetation in vulnerable catchments), capturing of pollutants from waste water and run-off (e.g. from agricultural land) in catchments of water bodies that are polluted or vulnerable to further pollution and habitat provision for threatened species. Some significant benefits could arise with regard to cultural services (e.g. recreation and tourism), but it is uncertain to what extent protected areas are needed to maintain such services in the region in the short term.

Forests, unsustainable forest management and carbon storage

34. Forest cover in the Southern partner countries as a whole is at around 2 per cent of the territory; the highest level is 13 per cent in Lebanon, 11.5 per cent in Morocco, 7 per cent in Israel and 6.5 per cent in Tunisia. Syria has just over 2.5 per cent forest cover. All others have less than 1 per cent forest coverage[3]. Egypt has the lowest percentage coverage at less than 0.1 per cent of territory being covered by forest.

35. Net forest coverage has increased over the 20 year period for most of the countries in the region - for example in Israel, Egypt and Tunisia. Only in Algeria does the FAO data used suggest a historical trend of net deforestation, though national data suggest that net deforestation may be less of an issue. There are, however, concerns of deforestation at local levels and associated issues of degradation across the region. Furthermore, a loss of a hectare of old growth forests generally implies a far greater loss of ecosystem services (carbon stored, water retention, storage and purification) and biodiversity than afforestation of new growth achieves – so the actual benefits of avoiding deforestation are more widespread and significant than average net national data would suggest. New growth or regeneration not only does not fully offset losses of old forest, but also in some countries current management practices do not allow natural regeneration, leading to increasing degradation and fragmentation. For instance, the reforestation rate in Morocco is considered below the optimal rate (15 to 20 per cent for maintaining a functioning level of ecosystem services).

[3] The value for the OPT has been estimated at 1.5% but the data appear less robust.

36. While the project has focused on ENPI wide comparable data, building on FAO, future research is clearly needed on national and local data at both gross and net forest changes.

37. Forests have multiple uses; in Southern partner countries a range have been designated specifically for production (particularly in Algeria, Tunisia and Morocco), for the protection of soil and water (particularly Libya and Jordan, but also Algeria, Egypt and Tunisia and to a less though still significant extent in Lebanon and Israel. A range of forests are also designated for the conservation of biodiversity – up to 18 per cent of forests in Israel and 12 per cent in Algeria and Morocco.

38. Carbon storage: forests in the Southern partner countries contain 328 million metric tons of carbon in living forest biomass, equivalent to 1202 million tCO_2. This is, however, an underestimate of the carbon storage in forests given that there are also important quantities in the soil and litter. Note also that the underlying data on carbon content per hectare of forest is still under-researched, and there are high variations across countries - e.g. the highest is in Egypt (near 100 tonnes C/ha for living biomass) and the lowest in Tunisia (around 10 tonnes C/ha for living biomass). This can affect the total values. Similarly the existing data on forest carbon only covers the living biomass and does not include the carbon in the soil and litter. This can be very significant and hence the carbon stored and the subsequent value calculations is probably an underestimate.

39. Meeting the ENPI wide target of halting deforestation by 2020 will (at a net level and based on historical projections) only be a relevant target for Algeria (halting all deforestation would affect all countries as there is land use change in all countries). Were historical trends as noted in FAO to continue to 2020, there would be a potential to save more than 180,000 hectares of forest in the next decade, corresponding to a net saving of about 11 million tons of CO_2 in living forest biomass. However, past trends do not necessarily well predict future developments and deforestation could be a major issue at the local and even at the national level.

40. Value of carbon storage, avoided loss and stock gains: Assuming a value of CO_2 of €17.2 /ton (low) and €32 /ton (high) in 2010, the value of the carbon currently stored by the forests would be estimated to range between €21 to €39 billion (see Box 4 for stock and marginal values). Around two thirds of this amount relates to Morocco's forests, the 5.1 million hectares, store 221 million tonnes of carbon (C), equivalent to 809 million tonnes of CO_2 and with a value range of €14 to €26 billion stock value today. Algeria has the second highest share at around 21 per cent. This is an indication of the value of the carbon stored in the living biomass today.

41. By 2020, the stock of carbon in living biomass - assuming projected carbon values of €39/ton (low) and €56/ton (high) – would suggest values of €48 billion to €68.5 billion (stock value). In Algeria, halting forest loss by 2020, would (building on FAO data and projections to 2020) enable between €400 and €600 million of potential carbon losses to be avoided. Other countries can similarly avoid carbon losses and hence avoid emitting CO_2 in halting local deforestation or degradation where realistically possible.

42. The benefits of forests as carbon store increases with the continued growth of forests – this has been estimated to lead to a carbon gain of €670 to €970 million for the ENPI South region from the growth in forests. The standing biomass also gains in value over the period given the expected rise in the 'value' of CO_2.

Land degradation – croplands

43. The economic contribution of agriculture varies across the Southern partner countries, ranging from less than 3 per cent of GDP in Israel and Jordan to 20 per cent in Syria in 2008. The sector continues, however, to be a major source of employment, ranging from 20 to over 40 per cent in Algeria, Syria, Egypt and Morocco.

44. Systematic and nationwide information on land degradation is scarce, but the global GLASOD survey indicates that severely and very severely degraded land ranges between less than 10 per cent of the national land territory in Israel and Egypt to 60-80 per cent in Syria and Tunisia.

45. Improving agricultural crop land management and reversing land degradation have many benefits, including increased agricultural crop yields, reduced soil and agro-chemical run-offs, reduced sedimentation of rivers, lakes and reservoirs, reduced water pollution, and can contribute to reduced desertification.

46. Improved crop land quality from better land management may provide important benefits in term of increased crop yields, ranging from an estimated nationwide average of 2-3 per cent in Israel to 7-15 per cent in Jordan, Syria and Tunisia.

47. The benefits of these yield increases amount to €4.9-8.6 billion (PPP) per year in 2020. This on average is equivalent to 0.36-0.65 per cent in the Southern partner countries, but as high as 0.6-1.0 per cent of GDP in Egypt, Morocco and Tunisia and 1.1-1.5 per cent of GDP in Syria in 2020.

Key Messages: Climate change

Renewable Energy Sources (RES)

48. Several countries are experiencing significant growth in CO_2 emissions, due to economic growth and rapid urbanisation. Power generation is primarily fuelled by fossil energy sources, mainly oil but also coal and natural gas, which are often imported. Renewable energy sources (RES) represent only a minor share of the total energy production.

49. The total CO_2 emissions from energy consumption in the region amounted to around 475 million tonnes of CO_2 in 2008, or an average of 2.4 tonnes of CO_2/capita. There is a wide range across the countries in the region, with per capital emission from energy use going from 1.3 tonnes of CO_2/capita/year in Morocco to 8.6 tonnes of CO_2/capita/year in Israel, reflecting climate, energy resources and infrastructure, economic activity, and social norms.

50. Renewable energy sources (RES) contribution to overall gross final energy consumption is currently just under 2 per cent for ENPI South (excluding OPT (no data) and Libya) – it provided 2.4 million tonnes of oil equivalent (mtoe) of a total of 124 mtoe final energy consumption for the region. The RES share in 2008 ranges from less than 1 per cent in Algeria to 8 per cent in Israel (mainly passive solar) and nearly 15 per cent in Tunisia (mainly waste-to-energy). The contribution of RES and in particular to electricity generation (at well below 1 per cent) is still far from its technical potential.

51. Potential for renewable energies: The increased uptake of renewable energy sources represents a major potential for the region to reduce GHG emissions as well as to address energy security (including reducing dependency from energy imports), cost issues as well as having a potential to create new employment and driver of the economy (also in isolated locations that are not connected to the electricity grid). It should also be taken into account that, while renewables themselves are non-polluting, the structures built to harness them can have positive or negative environmental impacts. It is thus crucial to make sure that possible impacts from RES on the local environment are avoided or mitigated. For example, dams for hydropower (e.g. in Morocco) may affect fish migration, while biomass use can increase deforestation.

52. In the Southern partner countries, the amount of gross final energy consumption from RES, if the ENPI RES target were not met, is estimated at around 2.6 mtoe – using a conservative energy conservation baseline (same per capita energy use) and a conservative RES share (building on existing RES share). If the 20 per cent ENPI wide target were met, the RES contribution would be 31 mtoe, around 24 mtoe more than in the baseline scenario which would displace other fuel use at the same relative share as today's fuel mix. A.

53. Avoided CO_2 emissions: An increase of the RES share of gross energy consumption from current levels to 20 per cent is estimated to reduce CO_2 emissions by about 92 million tonnes CO_2 by 2020.

54. Value of CO_2 savings: Assuming a CO_2 value ranging from €39 and €56 per tonne in 2020, the reduced emission from CO_2 estimated above will represent a saving of between €3.5 and €5.1 billion per year in 2020. For the purpose of comparing the results to current money values, if the RES target were to be met today the benefits from reduced emissions would be between €1.5 and €2.9 billion per year given lower carbon prices in 2010 (€17 and €32 per tonne).

Climate impacts and adaptation

55. A significant and accelerating trend in mean temperature increase has been identified in the region. Over this century rainfall patterns are likely to change, resulting in dryer summers and winters, but more extreme rainfall events resulting in increased flood risks.

56. These trends in climate are projected to result in a wide variety of impacts across sectors in the region and are judged to be overwhelmingly negative. Whilst agricultural crops may benefit marginally from enhanced CO_2 fertilisation effects, these are likely to be outweighed by water constraints and flooding that both reduce crop productivity.

57. The most common impacts identified across the region are: i) constraints on water resources arising from changing rainfall patterns combined with higher rates of evapo-transpiration, particularly on agriculture, exacerbation of desertification, and service access for urban populations; ii), coastal erosion and inundation; and iii) the impacts on infrastructure and other resources as a result of river flooding.

58. The potential impacts of climate change on ecosystems and biodiversity, human health and forestry are also recognised as being significant (some of which are assessed under other parameters studies in this report, such as biodiversity and water scarcity).
59. The recognition that climate change is occurring and is likely to continue has led to a wide variety of adaptation measures being considered to combat this range of potential climate change impacts. Emphasis is being put on adapting to projected water resource constraints in order to provide security of supply to domestic and industrial users as well as agricultural producers.
60. The need for such adaptation is acute given the current water stress across this region. The benefits of investment in water supply technologies combined with demand management strategies are particularly important for agricultural producers and urban consumers and are critical to economic development and social stability.

Recommendations

The insights from the analysis in the country studies underline that the environment merits being given greater attention in policy making, implementation, financing and enforcement. This offers benefits in terms of cost savings, potential contributions to a range of important other policy objectives, to improved security (food, water, energy and climate), and to improved quality of life of citizens.

Strengthening national environmental policies/targets and obtaining due support for their implementation, should result in progress in each of the air, water, waste, nature and climate change domains. Such progress will be a valuable step in the transition to a green, equitable economy.

In the current climate of change in the ENPI South region, environmental technologies can be a core driver of green, equitable growth and of job creation. Renewable energies are a major potential for the region, developing not only its own capacities but also exporting its capacities to Europe. Improving infrastructures is an opportunity to benefit many millions across the region in increased access to quality services, for example the areas of water or waste management. Safeguarding productivity by avoiding the degradation of natural capital also has the potential to help with poverty and rural urban migration issues.

The assessments done under this project, should be seen as a first illustrative assessment and not as a final definitive analysis. For national policy reflections own analysis could usefully be carried out to complement the indicative values calculated under this project; having a core set of country specific assumptions with a range of scenarios and sensitivities would offer additional nuance and robustness. National/local policy makers and stakeholders could therefore adapt the analysis framework used for the country benefit assessment reports and tailor the methodologies that have been developed and applied under this project. All methodologies are fully documented in the Benefit Assessment Manual (BAM) for Policymakers which has been developed under this project.
The results of this project could thus be taken further by the countries and used for conducting their own national benefit assessment studies, in order to support good governance and facilitate identification of priority areas for progress. A culture of benefit

assessments and taking account of the benefits of enhanced environmental protection in decision making should be encouraged.

Investment in measurement and data is key for management. There is a need for good data, indicators, and also a move towards (environmental) capital accounts and satellite accounts to help ensure that policy makers have due information at their disposal.

Finally, it should be kept in mind that the faster environmental policies are implemented, the earlier the benefits will be obtained and the longer these will be enjoyed. Acting quickly will also help avoid costs (of inaction) that can be significantly more costly than late action – so there is a double benefit of early action.

There is a major potential for a green new deal in the ENPI South countries focusing on a range of environmental improvements, which will benefit not just the environment (water and air quality, conservation status, forest health and soil quality), but also benefit health and wellbeing, livelihoods (jobs and community viability), economics and financing (avoiding costs) as well as supporting confidence in government.