World Bank

Birds and Solar Energy within the Rift Valley/Red Sea Flyway

Solar Energy is believed to be one of the renewable energy technologies with the least impact on bird populations and biodiversity. It represents an exciting and novel approach to lowering greenhouse gas emissions. However, there has been little research done on potential impacts of large-scale industrial solar, especially in the Rift Valley/Red Sea region and its associated ecosystems. The potential impacts are collisions with associated infrastructure, and possibly with panels; habitat loss, disturbance and fragmentation; and water use. These risks are likely to be site- and location-specific.

Partners and other Civil Society Organisations can minimise potential risks by:

- Highlighting the uncertainty over impacts of large-scale solar farms on birds, biodiversity and habitats to governments, donor organisations and developers
- Reviewing legislation and regulations in relation to siting of solar energy developments, and seeking opportunities for engagement
- Working with governments to ensure bird and biodiversity issues are considered within any development plans
- Ensuring the strategic siting of developments in the context of a national development plan;
- Advocating for strong legislation and regulations on use of **Environmental Impact Assessment** (**EIA**) and **Strategic Environmental Assessment** (**SEA**)
- Ensuring EIA takes place for each development, and that post-construction monitoring is included in any assessment
- Reviewing these assessments to ensure they include appropriate ornithological considerations, and are carried out by qualified independent consultants
- Calling and advocating for the EIA and post-construction ecological and bird data to be freely and publicly available from a centralised source
- Participating in any consultation processes and reviewing the outcomes
- Developing relationships with a wide range of different stakeholder groups including the private sector, governments and donor banks
- Promoting the need for further research on the impact of solar technologies, especially large-scale industrial developments
- Sharing best practice examples and guidance materials with other civil society organisations within countries and across the region.

BirdLife International supports the transition to more renewable sources of energy. Renewable energy will deliver a number of long-term benefits, such as reducing greenhouse gas emissions and increasing security and stability of supply, and help in achieving energy access for all. This transition must avoid harm to ecosystems and biodiversity.

This guidance document is aimed at informing BirdLife Partners and other Civil Society Organisations (CSOs) of the potential impacts of solar energy generation on birds and biodiversity, with the aim of reducing the potential impacts within the Rift Valley/Red Sea Flyway. Guidance material has been developed which is targeted at the other key stakeholders, including governments, donor banks and developers/consultants. These documents should be referenced when engaging with the different stakeholders. BirdLife International has also developed guidance material in relation to wind energy and electrical power lines, which complement this guidance material.

The potential for renewable energy generation within the region is very high, with significant developments planned or operating across the flyway. Many countries have made commitments to the generation of renewables as part of their energy mix. For example, Egypt has a domestic energy target of 20% from renewables by 2020, and Jordan has a target of 10% by 2020.

The high solar potential of the region has been noted, with extensive developments planned or in operation in a number of countries. Solar development globally is growing at a rate of 40% per year, but only contributes about 0.6% of electricity generation. Of all renewable energy resources, solar has the greatest theoretical potential for global energy generation. For instance Concentrated Solar Power (CSP) technology has the capacity to provide for about 7% of the total electricity needs projected for the world by 2030 and 25% by 2050[1].

This expansion in solar energy will occupy large tracts of land. For example the Shams 1 project in the United Arab Emirates, consisting of 768 parabolic troughs, occupies an area of 2.5 square kilometres. While solar has a significant role to play as part of a diverse energy mix, there is a danger that where consideration is not given to the cumulative effects associated with successive developments across a landscape, the risks to birds and biodiversity could be significant.

The technologies used in solar energy developments can be broken down into four categories:

1. **Photovoltaic/Concentrated Photovoltaic**, which converts the Sun's energy directly into electricity to be exported to the grid;
2. **Concentrated Solar Power** (**CSP**), which uses mirrors to concentrate the Sun's rays, and a fluid-based system to drive steam generators which deliver electricity to the grid;
3. **Solar thermal heating** panels use the direct heat of the Sun to raise the temperature of water. Panels are usually mounted on the roofs of buildings with a simple arrangement of dark-coloured water pipes beneath glass. This is used to heat water for buildings, swimming pools, and for various industries;
4. **Passive solar**, which generally refers to the use of glazing, building design and building orientation to contribute to space heating.

BirdLife recognises that a balanced approach to renewable energy development is needed, which recognises national, regional and international priorities, and in which competing interests and priorities are compared. Defining this approach is an intricate process, requiring the inputs of a range of stakeholders to ensure that balanced decisions and the most sustainable solutions are achieved and implemented.

The Rift Valley/Red Sea flyway is the second most important flyway in the world for migratory soaring birds. More than 1.5 million migratory soaring birds of 37 species use the flyway, including raptors, storks, pelicans, ibises and cranes, of which five species are globally threatened. BirdLife Partners and other CSOs play a significant role in ensuring the protection and enhancement of the flyway and its associated ecosystems, and are critical in ensuring its continued resilience.

Developments of solar energy parks will most likely mean the construction of additional power lines, the cumulative length of which could reach thousands of kilometres. Such power infrastructure may pose a high risk to birds and bird populations, potentially leading to the deaths of thousands of birds across the region annually. BirdLife International has produced a set of guidance material in relation to power lines for the region and this should be consulted and reviewed. Like other fact sheets in this series, this guidance is available through the Migratory Soaring Birds website.

This document will concentrate on the technologies of photovoltaic (PV) and concentrated solar power (CSP). Solar thermal and passive solar heating are not believed to pose any direct threat to birds and biodiversity, and in the majority of cases are confined to urban environments. This is also true for roof-mounted solar PV in the urban environment or single houses. The technologies used can have differing impacts depending on the specific characteristics of the site and species present.

Potential Impacts

Industrial-scale solar technologies are relatively new, with a limited number of significant developments worldwide, and as yet little is known about their impact on bird populations and biodiversity in general. Studies that have taken place have shown that the environmental effects are relatively benign, but no studies have been completed in the Rift Valley/Red Sea region. Therefore one of the most urgent requirements is for further research on the impacts of solar technology on birds, and biodiversity in general, within the Rift Valley/Red Sea flyway.

The effects of solar developments on birds and biodiversity could include:

- **Water use**: the volume of water used for cleaning purposes can be significant[2]. For Concentrated Solar Panel technologies, water may be used in the cooling process, or to generate steam to drive a turbine. The potential extraction rate can be very high[3] and may have a significant impact on local and regional hydrology and associated avifauna, especially in water-constrained areas;
- **Habitat loss/fragmentation**: potentially this is the largest impact, as large areas of habitat may be removed, replaced or degraded. The actual ecological significance of the impact will be site and scale specific; many developments are likely to have limited impacts. An assessment of the ecological value of the development's footprint will show the significance of the impact. The assessment of cumulative impacts is vital;
- **Risk of collision**: with associated infrastructure, including fencing and towers, but particularly with associated power lines. Some species of birds may collide with panels because they are attracted to shaded areas, particularly if panels are located in previously undisturbed areas;
- **Pollution**: activities during construction and ongoing maintenance, and the use of chemicals in CSP processes, could lead to the release of pollutants into the environment. Contaminated liquids in hyper-arid regions could be detrimental to large numbers of migrants.

A number of other scenarios have been put forward as potentially having an adverse impact, but there is limited data

[1] Estrela, Greenpeace International, Solar PACES (2009) The Global CSP Outlook 2009 www.greenpeace.org/international/Global/international/planet-2/report/2009/5/concentrating-solar-power-2009.pdf 2
[2] Guardian (2012) http://www.guardian.co.uk/environment/2011/dec/11/sahara-solar-panels-green-electricity
[3] Damerau K, Williges K, Patt A, Gauche P (2011) Costs of reducing water use of concentrating solar power to sustainable levels: Scenarios for North Africa Energy Policy, 39(7):4391-4398

on these, and they require further study

- **Disturbance**: Disruption of a bird's natural patterns of behaviour may lead to disorientation and increased energy use. Large arrays of panels may resemble water bodies, attracting some bird species. One study indicated that insects were attracted to laying eggs on panels, as they confused them with water[4]. The shade cast by panels can also attract birds. Disturbance during construction and maintenance may also be an issue. Other possible issues resulting from increased human access to otherwise inaccessible areas should also be assessed;
- **Change of habitat function**: the increase in shade and the changing water regime within a solar power plant change the micro-climate, and may change vegetation patterns. This means potential indirect impact on breeding and resting birds by changing food sources (e.g. seeds, insects, plants and animals) and also the use of the structures present for nesting;
- **Barrier effect**: Links within the flyway could be disrupted if very large areas are used without assessment of the cumulative impacts on migratory soaring bird populations, or if solar arrays occupy habitat at known resting sites, forcing the birds to abandon the area;
- **Potential heat damage**: a theoretical risk from heliostat technology, which concentrates solar energy on a central collector, generating temperatures in excess of 1000°C, is that birds flying within its beam may be injured or killed. One study at the now decommissioned Solar One facility in California indicated that while some birds were affected, the overall outcome was not significant[5].

The potential impacts are likely to vary depending on the site location, and also the particular species migrating through or resident in an area. Particularly high impacts are likely to occur where these developments coincide with migratory resting, staging or stopping-off spots, or areas of undisturbed habitat.

Another potential effect which requires further investigation is the ability of large industrial-scale projects to affect the thermal updraft of an area, which could impact, positively or negatively, on soaring birds. This requires further solar development-related research to identify the extent and range of impacts, if any.

A precautionary approach should be used in the selection and development of sites, but this need not deter developments in all cases, as mitigation actions and habitat manipulation may be possible when informed by appropriate assessment. Solar has a valuable contribution to play as part of a diverse renewable energy mix, and the benefits it can deliver should be noted.

Strategic planning and assessment

The potential negative impacts associated with renewable energy developments will be significantly reduced by the use of a positive planning framework and a strategic approach to development. Strategic planning should be used in conjunction with other mechanisms which reduce overall energy demand, and improve energy efficiency at the consumer level.

At the pre-planning stage a **Strategic Environmental Assessment** (**SEA**) should be carried out to identify areas which are suitable for development. This SEA is a vital component of any infrastructural development processes, and Partners and CSOs should engage with these processes at an early stage. The SEA should take into account existing as well as planned developments from other sectors. This helps to ensure that the cumulative impacts from solar combined with other sectors do not produce unexpected landscape barriers or hazards.

Partners should highlight the role of an SEA in identifying areas of high risk for development. Areas likely to be more vulnerable include Protected Areas and other sites important for biodiversity, such as Important Bird Areas, or sites adjacent to water bodies and other sites used by migratory soaring birds, such as resting, staging or stopping area. There should be a precautionary avoidance of such areas, as they are likely to be sensitive to development.

A range of stakeholders should be included at an early stage of consultation, including local communities, indigenous peoples, planners, researchers, and specific interest groups including conservation groups. Stakeholder consultation enables expert and local knowledge to be incorporated at an early stage, and participation should occur throughout the processes. Partners and CSOs should seek to provide input into any SEA processes, and they can play an important role by working with other stakeholders to inform governments and national authorities of the need to appropriately assess and select sites.

The use of a SEA enables governments and developers to identify long-term strategic areas for future development, and also to cut down on potential impact costs in the future. An SEA should be carried out by trained professionals. The assessment methods for the ornithological appraisal require expert review prior to commencement, to ensure that the appraisal is to a high standard and generates accurate results. An appropriate SEA will greatly aid in the ability to identify the cumulative effects that solar developments could potentially have across a landscape, and the impact of habitat fragmentation.

The SEA will be reinforced and enhanced when it is conducted in partnership with **sensitivity mapping**, which presents a view of the sensitivities of bird species to infrastructural developments. BirdLife International has developed and is continuing to refine a sensitivity mapping tool for the Rift Valley/Red Sea Area, relating to wind farm developments and migratory soaring birds. Although the sensitivity layer is specifically for wind farms and associated infrastructure, it shows congregations of migratory soaring bird species, and also areas important to migratory soaring birds, which can help inform site selection for solar developments. Other decision support tools such as IBAT are useful in assessing appropriateness and sensitivities of particular locations.

When sites have been identified it is essential that the developer be required to undertake a site-specific **Environmental Impact Assessment** (**EIA**). This must appropriately assess the ornithological value and biodiversity of the site, such as the flora, reptiles and mammals, including nocturnal species like bats. For solar projects a detailed hydrological impact study may be necessary, depending on the technology used, as additional water use may have a high impact in a water-constrained environment.

Partners and CSOs should advocate for an EIA to be a requirement before permission for developments will be granted. Permits should not be issued for developments which could have significant environmental impacts. Partners should highlight the role an EIA can play in identifying any potential issues, and providing solutions to these issues. Partners and CSOs should engage with the stakeholder consultations at an early stage, to ensure their concerns are addressed. It is vital this EIA is carried out to a high standard, by qualified professionals, and is appropriate for the site and location. The techniques and methods used in undertaking these surveys should be capable of replication as part of a post-construction monitoring programme.

[4] Horváth, G., Blahó, M., Egri, A. *et al*. (2010) Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects. Conservation Biology. 24(6):1644-1653

[5] Horváth, G., Blahó, M., Egri, A. *et al*. (2010) Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects. Conservation Biology. 24(6):1644-1653

It is essential that any survey identifying the ecological value of the development's footprint includes the additional area required for construction, and a buffer zone, to allow for any changes in the proposed development and assessment of possible edge effects. The MSB project will be developing guidance on ornithological assessment and EIA in the coming months.

These pre-construction surveys should include:

1. **Breeding bird surveys** to assess potential footprint and buffer zone impacts of a development on resident species;
2. **Vulnerable and protected species-specific surveys** for species that may need individual assessment, e.g. nationally and internationally important bird, reptile and mammal species, or congregatory/colonial bird species;
3. **Migratory bird surveys** may be required if the site is along a migratory route. If required, this should include **vantage point surveys** undertaken during migration periods, particularly at or near bottlenecks, and should cover the seasonal variation during a year-long period;
4. **Hydrological Assessments**, depending on the technologies used.

The EIA should also consider the ecological needs of the species occurring within the site, and provide recommendations regarding possible mitigation measures, such as leaving or creating habitat corridors, creating complementary habitat, or ecosystem restoration. One option that could be considered is contiguous/compensatory habitat development to compensate for loss of habitat due to the solar development. This should only be considered once the other avenues of the mitigation hierarchy have been considered. This compensatory land will require an appropriate management plan to maximise its biodiversity potential. BirdLife Partners are well placed to review this management plan, to ensure it is appropriate, and provide input into ways it can be improved to deliver bird and biodiversity benefits.

The ecological data generated by the EIA should be stored in a publicly accessible, centralised information system, which enables strategic analysis and also the generation of greater knowledge. Partners should advocate for this information to be freely accessible, and for a mechanism to be put in place to act as a repository for this data. BirdLife Partners and other CSOs should also call on national and/or regional governments to make available a register of all existing and proposed developments, as this can aid in the assessment of likely cumulative impacts.

It is essential that, as part of any EIA, the Environmental Management Plan is open to stakeholder consultation, and that a non-technical summary report is also produced. Partner organisations should review the Environmental Management Plan and assess its appropriateness, and comment on any issues they believe are important.

The EIA will aid in identifying the impacts upon birds and other taxa at the site/project level. It enables specific risks to be addressed and outlines **specific avoidance and mitigation actions**, which will reduce the impact on birds and biodiversity. Robust pre-construction baseline surveys are an essential component of any EIA. The **baseline surveys** should take place for a minimum of one year. BirdLife Partners should engage with the EIA processes and ensure ornithological concerns are included. If they have concerns in regard to inappropriate developments, these should be communicated to a wide audience.

Power lines and associated infrastructure

The power line infrastructure which carries the power generated by solar farms to the end user can potentially have a significant impact on birds and bird populations. This impact could be reduced by using appropriate mitigation measures. These measures include the appropriate routing of the lines, use of bird deflectors, and pole design which minimises electrocution risks. Any impact study of a development must take into consideration the infrastructure needed to connect the solar development to the national grid.

Further details can be found in the BirdLife guidance produced for the region in relation to power lines. Routing and mitigation actions should be informed by an SEA and EIA. Partners and CSOs can refer to this guidance material for further information. Within a development, all power line cables should be routed underground. Where developments are planned, they should be located close to the existing grid to reduce the need for additional infrastructure.

Construction activities

The construction of the renewable infrastructure has the potential to have a significant impact on biodiversity, in particular resident bird species with territories close to the construction site. These impacts can be reduced by utilising environmentally sensitive construction practices and techniques, including habitat restoration at the site level. Care should be taken in the handling of toxic materials, and they should be recycled or disposed of safely.

Mitigation actions

The best way to avoid any potential negative impacts of a development on birds and biodiversity is to select an appropriate site.

Mitigation actions for solar developments include:

- Timing of construction to minimise disturbance, e.g. avoiding the breeding season;
- Placing of white strips along the edges of the panels to reduce the similarity of panels to water, to deter birds and insects;
- Some CSP technologies can use 'dry' cooling technologies. Although more expensive, these can reduce the amount of water extracted from the local environment;
- For CSP technology, reflective surfaces which are parabolic (curved) in shape reduce the likelihood of skyward reflection, whereas flat heliostats have an increased associated risk of being reflective, and therefore potentially attractive to birds;
- Trough receivers should use evacuated glass tubes or similar technology to reduce heat loss, which results in low receiver temperatures which will not burn birds;
- Use fencing and wire grids to ensure evaporation ponds are not accessible to birds and other fauna. This is to reduce the possibility of a) attraction b) drowning c) poisoning;
- Use of translocation to protect the terrestrial species (e.g. reptiles, amphibians) present at a development site during construction and operation. This requires a receptor site with suitable habitat and viable population levels;
- Fencing should not hinder species movements at the site level, and fencing should incorporate bird diverters;
- Minimum clearing of native shrub and plant communities;
- Nocturnal lighting should be kept to a minimum to avoid attracting birds.

Appropriate management of the space between and beneath solar panels, and good maintenance practices (such as confining vehicular access to defined tracks) can also minimise environmental impacts. When developments are sited in

degraded land, biodiversity can be improved, but in pristine ecosystems, development will almost certainly be detrimental.

Recent developments within CSP technologies, where sunlight is focussed on a receiver which is very close to the mirror, should be investigated. This design makes it less likely that a bird will fly between the receiver and mirror, reducing the likelihood of heat damage.

Post-construction monitoring

In light of the limited understanding of solar development on birds, post-construction monitoring should be a standard recommendation for any new solar plants that are approved, especially in regions of significance for birds. Once a solar development has been constructed, the ongoing effects on bird populations and biodiversity should be monitored, so that potential long-term impacts can be identified and addressed.

A range of surveys are required to assess the potential impact on birds. These surveys should include

1. Assessment of residents, breeding and seasonal species compared with baseline surveys;
2. Vantage point surveys to assess any impacts on soaring birds during intense migration periods or wider movements;
3. Regular and systematic surveys for bird casualties on site;
4. A minimum of one year's post-construction monitoring, and a review process which provides the ability to react to results of surveys and identified impacts. Three years may be required for significant areas along the migratory route.

Continuous monitoring generates information on establishing the range and extent of any operational impacts, and will inform the need to adapt mitigation actions and operational procedures within the development. This monitoring should be carried out in a standardised way by qualified individuals. It is critical for a new and developing industry that it undertakes monitoring to identify any potential impacts that may arise.

These studies should be scientifically accurate, be freely available, and be used to inform future developments within the sector. This should be a requirement for the development of all large-scale solar projects. The Before After Control Impact (BACI)[6] approach should ideally be used, which compares the data collected in pre-construction surveys with data obtained from the post-construction monitoring and control sites, in order to assess environmental impacts caused by solar farm construction and operation.

Strengthening national and international legislation

National legislation

National Partners and other CSOs should seek to engage with governments and national authorities to provide input into any development plans, and highlight the need to integrate bird and biodiversity concerns. A review of existing legislation and regulations will be necessary to identify any gaps where bird and biodiversity concerns can be integrated. Partners should identify and liaise with the designated national authority in charge of delivering renewable energy projects, and provide guidance on how potential risks can be minimised.

Partner organisations should support calls for the development of a national planning framework for infrastructure projects, including energy, which integrates biodiversity considerations, and for the strategic development of renewable technologies.

National legislation in relation to the use of SEA and EIA should be consulted, to ensure appropriate impacts have been investigated. If no legislative framework is in place that requires the use of SEA and EIA for development of infrastructure projects, it should be the priority of each organisation to lobby for the creation of such legislation and ensure that it is implemented. Once bird and biodiversity concerns are required to be appropriately assessed within the SEA and EIA frameworks, they can be mainstreamed across multiple sectors related to development planning. There is precedent for the development of national legislation and standards for the use of solar energy. The German Renewable Act specifies that a local development plan and EIA are required before a solar plant can be approved.

Other national legislation, for example related to protected areas and species, should also be used as a tool to address the negative impacts of development. Partners and CSOs should work to strengthen existing environmental legislation, especially in relation to the disposal of toxic materials, and to environmentally-friendly construction practices. Alliances and partnerships are useful ways of increasing the impact of recommendations. By sharing this and other guidance documents with other civil society partners, messages and key asks can be communicated and taken up by different organisations.

Stakeholder consultation is a necessary part of an SEA or EIA, and should be enshrined in any SEA or EIA legislation. BirdLife Partners should seek to engage with the stakeholder consultation, and to inform other organisations of their concerns and recommendations. Advocating for the need for stakeholder participation and consultation may be necessary, including calling for mechanisms to make these processes transparent and thereby ensure legitimacy.

The impact of solar power generation on birds and other biodiversity is not well known. This new technology is expected to grow substantially into the future, with significant developments in the region. Ongoing monitoring and research is necessary to understand the impacts, and to inform future mitigation measures. Partners should ensure that appropriate monitoring takes place, and that governments commit to the publication of the results. The data which is gathered, both ecological and bird-related, should be freely available from a centralised public source. This requirement should be set out in legislation or regulations. Details of all planned and existing infrastructural projects, both private and publicly funded, should also be published and made publicly available.

International Agreements

BirdLife International supports renewable energy generation and believes a positive planning framework can reduce the negative impacts on birds and biodiversity. We call on all stakeholders to adhere to the precautionary principle. The Strategic Plan for Biodiversity 2011-2020, adopted at Convention on Biological Diversity (CBD) COP 10 in 2010, provides a comprehensive global framework for achieving the vision of 'Living in Harmony with Nature', including the 20 headline Aichi Targets for 2015 or 2020. These targets called for the mainstreaming of biodiversity across government, so that biodiversity values are integrated across sectoral plans and policies and adverse effects can be minimised. This should include the energy sector, and national governments should be reminded of their commitments and obligations under various multinational environmental agreements.

As industrial-scale solar is a relatively new and rapidly developing technology, there are as yet very few international agreements or resolutions in relation to solar energy and birds or biodiversity. However, various international conventions do refer to renewables and infrastructure. The recent COP11

[6] McDonald, T.L., Erickson, W.P. & McDonald, L.L. (2000) Analysis of Count Data From Before-After Control-Impact Studies. Journal of Agricultural, Biological and Environmental Statistics. 5: 262-279

meeting of the Ramsar Convention, held in July 2012, contains a specific resolution in relation to Energy. Resolution XI.10 on 'Wetlands and Energy Issues' provided guidance on addressing the implications of the policies, plans and activities of the energy sector for wetlands, stressing the need for integrated planning.

There are also resolutions within the Convention on Migratory Species (CMS) related to migratory birds and energy infrastructure. These include Resolution 7.4 'Electrocution of Migratory Birds' from the 7th Conference of the Parties (COP) in 2002, which calls on the parties to the convention to curb increasing electrocution risk from medium-voltage transmission lines, and Resolution 10.11 'Power lines and Migratory Birds', adopted at COP10, which developed specific guidelines on mechanisms to reduce power line impacts on birds, and urged countries to implement these guidelines, including 'development of specific impact criteria to be applied in selection of energy generation sites'.

The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) also addresses power lines and renewables. Specific resolutions include 5.11 on 'Power lines and Waterbirds' agreed at the 5th Meeting of the Parties (MOP) in 2012, and Resolution 5.16 'Renewable Energy and Migratory Water birds', calling for the development and strengthening of national renewable energy planning, and for developments to include monitoring in order to avoid and minimise the adverse effects of renewable energy installations.

Many donor organisations and development banks have also made international commitments to preserve environmental integrity, and to help in mainstreaming biodiversity within national governments, and should be reminded of these commitments. These include a commitment to help national governments reach their environmental goals, as set out in the Paris Declaration on Aid Effectiveness, which should include their international commitments under the CBD, but also the mainstreaming of biodiversity concerns across sectors and departments. The Accra Agenda for Action highlighted the need to support country environmental planning systems, including enhancing capacity for and use of EIA and SEA, and engagement with civil society. Many also have environmental and social safeguard policies which should specify the use of SEA and EIA. Given the limited knowledge regarding the impact of solar developments on birds, donors should be reminded of the precautionary principle and the need to carry out EIA for each project.

BirdLife International recognises that there has been limited investigation into the impact of solar energy generation on birds and biodiversity, and believes that given the proposed expansion and the scale of individual developments within the region, more research and in-depth analysis is needed to inform the sector and future developments.

This factsheet is part of a suite of guidance materials produced by BirdLife for governments, financiers such as development banks, and developers and consultants. These factsheets can be used to engage and lobby stakeholders on specific issues where there is a need to reduce the negative impacts on birds. The sharing of good practice examples and success stories with regional partners will ensure that lessons can be learned.

These factsheets can be shared with other civil society organisations, to increase the knowledge of what potential impacts developments can have on birds; and also of how, when appropriately sited, constructed and operated, developments can have little or no negative impact, and deliver lasting sustainable development.

More details on the Migratory Soaring Bird Project can be found on the link below. Specific guidance in relation to wind energy, power lines and solar energy is to be published, and a sensitivity mapping tool is being developed and will be available over the coming months.