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## Birds and Wind Farms within the Rift Valley/Red Sea Flyway

Wind energy can make a valuable contribution to reducing greenhouse gas emissions and developing a green economy. BirdLife welcomes the development of wind within the region and supports the transition to renewable energy.

However, wind farms are likely to pose a significant risk to birds if they are inappropriately located. Any adverse impacts are likely to be associated with collision, disturbance/displacement, and barrier effects.

BirdLife Partners and Civil Society have an important role to play in reducing the adverse impacts on birds and biodiversity by:

- Reviewing national legislation and planning procedures to identify opportunities for engagement
- Working with governments to ensure bird and biodiversity issues are considered in any development plans;
- Advocating for strong legislation and regulations regarding **Strategic Environmental Assessment (SEA)** and **Environmental Impact Assessment (EIA)**
- Ensuring these assessments include ornithological considerations
- Highlighting a precautionary avoidance approach for the location of wind farms where there may be adverse impacts on important areas for birds and biodiversity
- Communicating the benefits of sensitivity mapping tools in showing areas where birds are likely to be vulnerable to developments
- Ensuring full Environmental Impact Assessment that include appropriate ornithological surveys for all developments
- Engaging in stakeholder consultations as part of the SEA and EIA processes
- Reviewing ornithological surveys to ensure they are carried out to a high standard
- Working with other interested organisations to ensure that biodiversity and bird concerns are mainstreamed across sectors and government
- Engaging with donors and development banks to ensure that bird and biodiversity concerns are safeguarded in projects
- Ensuring that mitigation actions are appropriate and are being implemented, and are informed by post-construction monitoring
- Developing relationships with a wide range of groups, including the private sector, to ensure bird risks are minimised
- Sharing best practice examples and guidance materials with other civil society organisations, within countries and across the region
- Calling for ecological information to be freely available, accessible and stored in a central database.



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BirdLife International supports the transition to more renewable sources of energy. However this transition must avoid harm to ecosystems and biodiversity. Wind farms can make a valuable contribution to tackling climate change by providing energy with substantially lower emissions than fossil fuels, and at a significant viable scale.

However, poorly designed and sited wind farms have been shown to have detrimental effects on birds. BirdLife recognises that a balanced approach to wind energy development is needed, which recognises national, regional and international priorities, and in which competing interests are considered. Defining this approach is an intricate process that requires the inputs of a range of stakeholders, to ensure that balanced decisions and the most sustainable solutions are achieved.

Special attention needs to be given to the development of wind farms and the associated power lines along migration flyways. The Rift Valley/Red Sea flyway is the second most important flyway in the world for migratory soaring birds. Over 1.5 million migratory soaring birds of 37 species including raptors, storks, pelicans and cranes use the flyway, five of which are globally threatened.

The potential for the generation of renewable energy within the Middle East and North Africa is very high, with significant developments planned and already in operation across the flyway. The Red Sea Coast alone could potentially produce 20GW of electricity annually from wind. 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 has designated 650 km<sup>2</sup> of land adjacent to the Red Sea specifically for wind farm development. Jordan has a target of 10% energy from renewables by 2020. These ambitious commitments will lead to substantial land area being set aside for development. To be truly sustainable and to maximise the benefits of increased energy security and reduced environmental externalities, developments must be located in appropriate areas.

## Potential Impacts

Wind energy developments can potentially have serious negative impacts on birds and other biodiversity such as bats, both from the turbines themselves and from associated infrastructure, such as power lines. For example, the installation of 68 wind turbines on the Smöla archipelago in Norway may have caused the local breeding population of White-tailed Eagles *Haliaeetus albicilla* within the wind farm to decline. From 2005-2009 there were 28 casualties, 16 being adult birds potentially holding a territory<sup>1</sup>. The Altamont Pass development in California, USA, with over 5000 turbines, is responsible for the deaths of an estimated 1000 raptors annually<sup>2</sup>.

Particularly high impacts are likely to occur where these developments coincide with migratory bottlenecks.

Significant effects of wind farms on birds can include:

- **Collision:** with turbines, blades and guy ropes, leading to death or injury;
- **Displacement** from habitats, or **Barriers** along preferred migratory routes ;
- **Habitat loss or change:** fragmentation of landscape, or site-specific damage ;
- **Cumulative impacts** of successive developments could be significant.

The potential impacts are likely to be variable depending on the site location, and also the vulnerability of species migrating through or resident in an area. BirdLife Partners with knowledge

of areas significant for birds are well placed to influence the debate surrounding the likely impacts of developments, and comment on appropriate locations.

## 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, such as efficiency improvements at the consumer level, e.g. regulations on the use of low energy lighting, to reduce overall energy demand. Partners and CSOs should review existing development plans and advocate for a strategic planning framework to be designed and implemented, highlighting the necessity for the inclusion of bird and biodiversity issues in any strategic plans.

Where there is a high probability of significant impacts, this area should be excluded from future development. Protected areas and other sites important for biodiversity, such as Important Bird Areas, could be at higher risk of negative impacts, and there should be a precautionary avoidance approach for the location of wind farms in such areas.

The use of a **Strategic Environmental Assessment (SEA)** at the pre-planning stage enables governments and developers to identify long-term strategic areas for future development, and to cut down on potential impact costs in the future. An SEA should be carried out as part of a strategic planning framework, and can be used to input into national development plans.

A range of stakeholders including local communities, indigenous groups, planners, researchers, and specific interest groups including conservation groups, should engage in the consultation processes. An SEA is one of the main tools to mainstream biodiversity and birds across a range of government departments and sectors. Partners should engage with the SEA processes, and provide inputs into its development, underscoring the need to integrate ornithological considerations. By engaging in the consultation, local and expert knowledge will be included.

An SEA will help identify potential cumulative effects across a landscape. The SEA should take into account planned as well as existing developments from other sectors, to ensure that cumulative developments do not produce unexpected landscape barriers or hazards. An SEA should be carried out by trained professionals, and follow international best practice recommendations, for example the voluntary guidelines of the Convention on Biological Diversity<sup>3</sup>. 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. BirdLife Partners can identify whether the appropriate methods have been used, and highlight any gaps.

Civil Society Organisations and BirdLife Partners can play a significant role in ensuring developments take place in a planned and strategic way, which minimises the negative environmental impacts projects, may have, and maximises the benefits of renewable energy, now and for future generations. The capacity of organisations to do this will be greater when they know of all of the developments taking place within a country and region. Having a central repository of existing and proposed developments and their locations will greatly aid organisations to identify high risk projects and also potential cumulative impacts. BirdLife Partners and other CSO should advocate for the publication and continued availability of project proposals and locations (proposed, existing and rejected) by a single designated national authority.

<sup>1</sup> Dahl E. L., Bevanger K., Nygard T, Roskaft E, & Stokker B.G., (2012) Reduced breeding success in white-tailed eagles at Smöla windfarm, western Norway, is caused by mortality and displacement Biological Conservation 145 79-85

<sup>2</sup> Smallwood, K. S. and Thelander, C. G. (2008) Bird mortality in Altamont Pass Wind Resource Area California. J. Wildl. Manage.72: 215-213.

<sup>3</sup> CBD (2005) Guidelines on biodiversity-inclusive Strategic Environmental Assessment (SEA) [www.cbd.int/doc/reviews/impact/SEA-guidelines.pdf](http://www.cbd.int/doc/reviews/impact/SEA-guidelines.pdf)

The SEA will be reinforced and enhanced when it is conducted in conjunction with **sensitivity mapping** tools, which record the locations and movements of species that are vulnerable to the impacts of infrastructural development. These tools allow for the risks associated with the impacts of development of wind turbines to be identified at an early stage of planning, and avoided or substantially reduced through selection of appropriate locations for development. BirdLife International has developed and will continue to refine a sensitivity mapping tool for the Rift Valley/Red Sea Flyway, which provides valuable information on the potential impact on birds of wind energy development along the flyway. Partners should actively promote the utility of the sensitivity mapping tool to all stakeholders involved in the energy sector, and encourage its use. CSOs can refer to the sensitivity mapping tool to identify whether developments are located in, or close to, a high risk area.

When potentially appropriate sites have been identified, it is essential that the developer be required to undertake a site-specific **Environmental Impact Assessment (EIA)**. The EIA will aid in identifying the extent of risks to birds and other biodiversity 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.

The EIA must appropriately assess the ornithological and biodiversity value of the site. Ideally ecological data generated by the EIA should be stored in a centralised and accessible information system, which enables strategic analysis and also the generation of greater knowledge, including the birds within an area and the likelihood of potential impacts. CSOs and Partners should advocate for governments to put in place a mechanism which allows this information to be available and accessible.

It is essential that an Environmental Management Plan is produced, and is open to stakeholder consultation; a non-technical summary should also be produced in the local language. Partners and CSOs should engage in the consultation processes, review the methodologies and comment on their appropriateness and outcomes. Any inconsistencies or failings should be highlighted.

Although a precautionary avoidance approach should be adopted for the location of turbines, an appropriate EIA assessment will recognise that, depending on the technologies being put forward, the habitats at the site, and the species involved, developments may be possible in areas that are important for biodiversity, without significant adverse impacts.

A robust baseline survey is an essential component of an EIA. Within key areas of the flyway, the use of radar to aid assessment is strongly recommended. Over the coming months BirdLife International will be developing specific guidance in relation to appropriate EIAs.

## Power lines and associated infrastructure

The power line infrastructure which carries the power generated by wind farms to the end user can potentially have a significant impact on birds. This impact could be reduced by using appropriate mitigation measures, including the appropriate routing of the lines, using bird deflectors, and pole design which minimises electrocution risks. 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. Within a wind farm development, power line cables should be routed underground and follow access roads where possible.

## Construction activities

The construction of a wind farm has the potential to have a significant impact on biodiversity, in particular on 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.

Good construction techniques include (1) minimising any clearing of natural vegetation; (2) implementing adequate measures to control soil erosion and runoff; (3) ensuring proper disposal of all solid and liquid wastes; (4) ensuring construction materials come from local and environmentally sustainable sources; (5) restoring cleared areas where feasible. Construction should be timed to avoid times of peak sensitivity, such as the breeding season or periods of peak migration. Good construction techniques should also include measures to prevent the introduction of invasive non-native species and controls on hunting by construction personnel or contractors. Partners should seek assurance that project legal agreements require environmentally-friendly construction activities such that environmental impacts are minimised.

## Mitigation actions and adaptive management procedures

Mitigation actions are site and location specific; Partners should advocate for the inclusion of mitigation actions and the need for adaptive management in project contracts and bidding documents. With their ornithological knowledge, BirdLife Partners are well placed to review the mitigation actions to see if they are appropriate, that impacts are limited, and that those actions are implemented and successful.

Mitigation actions include:

- Lattice tower structures should be excluded as they provide perching areas;
- Micro-siting of turbines within a development. Identifying sensitive positions or plots within the wind farm prior to construction, as part of the EIA processes, and siting turbines outside these areas. For example, at Foote Creek Rim, Wyoming, USA, pre-construction surveys showed that about 85% of the raptors flying at likely strike height were within 50 metres of the canyon rim edge, and no turbines were established within this zone<sup>4</sup>;
- Configuration of turbines should run parallel to features such as valleys and rivers. If a flight path exists the configuration and placement of turbines should also run parallel to this;
- Decommissioning by removal or re-location of high impact individual turbines within a development;
- Shutdown-on-demand: strategic shutdown of turbines at specific locations or at specific times (i.e. peak migration movement or poor visibility) to minimise the impacts. This must be combined with monitoring surveys and ideally the use of radar. Shutdown-on-demand in Spain reduced vulture mortality by 50%, with a loss of energy production of 0.07%<sup>5</sup>;
- Larger turbines generate electricity at lower cost and higher efficiency. Fewer but larger turbines may have a reduced impact on birds. However this is site-specific, and should be informed by local site characteristics and bird activity;
- Experiments with contrasting colour on blades to increase visibility and reduce striking probability are ongoing. This may lower mortality risks, but is unproven at this moment;

<sup>4</sup> Johnson G, Wallace P, Erickson, M, Strickland D, Shepherd M F, Shepherd D and Sharon A. (2002) Collision Mortality of Local and Migrant Birds at a Large-Scale Wind-Power Development on Buffalo Ridge, Minnesota. *Sarappo Wildlife Society Bulletin* Vol. 30, No. 3 (Autumn, 2002), pp. 879-887

<sup>5</sup> de Lucas, M., Ferrer, M., Bechard, M.J. & Muñoz, A.R. (2012) Griffon vulture mortality at windfarms in southern Spain: Distribution of fatalities and active mitigation measures. *Biological Conservation* 147: 184-189

- If aircraft warning lighting is required to identify turbines at night, the use of blinking strobe lights, with flashes interspersed with darkness at 3 second intervals, is preferred. Continuous lights can lead to an increase in fatalities by attracting birds, with an associated increase in the risk of collisions with infrastructure. The number of lit turbines should be kept to a minimum. Lights should flash synchronously over the site. The Federal Aviation Authority regulations in the USA allows for proportions of turbines to be lighted e.g. one in five to be marked, but lighting should comply with national aviation legislation;
- The use of guy ropes should be minimised, including on meteorological towers. Where guy ropes are used, bird deflectors should be installed;
- Good maintenance practices, such as filling of holes in turbine body so that nesting and perching is not possible;
- Habitat management and maintenance practices at the site level to reduce the risk of attracting collision-prone birds, e.g. avoiding establishing ponds or waste sites;
- Increasing turbine cut-in speed can reduce the risk of bat fatalities.

Where mitigation actions do not appear to be working, or the appropriate mitigation is not occurring, redress action may be appropriate under an 'adaptive management' approach. It may be possible to engage with officials linked to the development, to inform them of the need to adapt their operations, although ideally the need for this should be included as a condition in the consent for the project, and so be enforceable by the regulator/consenting authority.

The 'mitigation hierarchy' of 'Avoidance, Minimisation (mitigation), Rehabilitation/Restoration, Offset'<sup>6</sup> should be adhered to. The primary objective must be to avoid any adverse impact, which can be done through appropriate site selection. Mitigation actions such as shutdown-on-demand are a mitigation measure, not a mechanism to allow development in high-risk areas. Offsets as part of the mitigation hierarchy should be the option of last resort and if required should be directed towards conservation efforts and habitat restoration, targeting those species and habitats affected by the development.

## Post-construction monitoring

Once a wind farm has been constructed, the ongoing effects on birds and biodiversity should be monitored, so that potential long term impacts can be identified and addressed. Monitoring should take place for three years post-construction and should cover all four seasons.

**Continuous monitoring** generates information on the operational effects of wind farms, and will inform the need to adapt mitigation actions and operational procedures. This monitoring should be carried out in a standardised way, by recognised professionals. It should be comparable to the pre-construction surveys. Monitoring activities should include mortality surveys, and be designed to deliver robust, scientifically accurate information which can be made publicly available, allowing Partners to study and formulate positions on the impacts of differing developments. Over the coming months, BirdLife International will be developing guidance material in relation to post-construction monitoring.

The EIA, the pre-construction baseline surveys and post-construction monitoring must include an accurate assessment of birds present, and the significance of the area impacted by a project. The methods used should be reviewed by a trained ornithological expert and BirdLife Partners can help ensure these methods are appropriate.

The methods should include:

1. Migratory bird surveys techniques should reflect the specific circumstances of the region, namely large concentrations of soaring birds
2. Assessment of birds breeding within the site, and within an appropriate buffer zone
3. Vantage point surveys throughout the year, with intense monitoring during peak migration periods
4. Species-specific assessments for rare or threatened and breeding bird species for collision risks and/or displacement
5. Winter ornithological surveys may also be required
6. Carcass searches and mortality surveys (post-construction monitoring).

## Strengthening national and international legislation

### National legislation

A primary action for Partners and CSOs should be a review of existing legislation and regulations which relate to the development of wind farms. This could include planning regulations, national and regional development plans, and environmental and national resource strategies. By reviewing the existing legislation, some entry points may be identified which can be used for lobbying and advocacy purposes.

Partners and other CSOs should support calls for, and contribute to, the development of a national planning framework for infrastructure projects, including energy, which integrates biodiversity considerations; and for the strategic development of renewable technologies as part of low carbon economies. National development plans and sustainable development plans should be consulted to review whether appropriate consideration has been given to birds and biodiversity. A number of national ministries can be involved in the energy development sector, so bird and biodiversity concerns should be mainstreamed across the various departments. The establishment of national working groups can provide a valuable platform for discussion.

SEA and EIA provide the main tools for mainstreaming environmental considerations across a number of key sectors relating to development, including planning. Partners can gain access to a wider variety of audiences by engaging in an SEA process. Working with other civil society organisations, including local communities and other conservation organisations, will enable the benefits associated with mainstreaming of the environment to be realised. These benefits can include the incorporation of environmental concerns within planning considerations, and the internalisation of environmental externalities by finance departments. SEA and sensitivity mapping can provide valuable inputs into national and regional development plans.

National legislation in relation to the use of SEA and EIA should be consulted, to ensure appropriate impacts have been investigated. These SEA and EIA processes must take account of the ornithological impacts. If no legislative framework is in place calling for the use of SEA and EIA for the development of infrastructure projects, it should be the priority of each Partner and other organisations to advocate for the creation of such legislation, and ensure that this legislation or regulations are implemented.

The ecological data which is generated through the SEA and EIA processes should be freely available to all stakeholders. This ecological data will provide the information and knowledge

<sup>6</sup> Business and Biodiversity Offsets Programme (BBOP) (2012) Standard on Biodiversity Offsets. [www.forest-trends.org/documents/files/doc\\_3078.pdf](http://www.forest-trends.org/documents/files/doc_3078.pdf)

base on which future decisions can be made. Access to this information, and legislation which ensures this, will greatly improve the likelihood that developments will take place in a strategic way, with limited impacts, as informed decisions can then be made. BirdLife Partners can provide input into this centralised information system, as well as monitor the data for scientific robustness, and also for species and population trends.

Compliance with the appropriate environmental legislation is a priority, and specific redress and enforcement mechanisms must be put in place. These mechanisms should be robust enough that non-compliance will result in a significant risk for a developer/investor. A monitoring system should be put in place to ensure compliance. Periodic reviews should take place over the operational timeline of a development, to make sure the adaptive management operations are continuing.

Negative impacts from actual and proposed developments should be communicated effectively to a wide variety of audiences, including government departments, civil society and the public. An effective communication strategy can generate the political commitment and industry buy-in needed to achieve appropriate development, and the ongoing adaptive management actions necessary to reduce the impact on birds.

Other national legislation, such as that related to protected areas and species, should also be used as a tool to inform planning. Partner organisations should work to strengthen existing environmental legislation.

## International Agreements

National governments have adopted and signed a number of international agreements which provide entry points for engagement. A number of these international agreements refer to the need to mainstream biodiversity concerns across all sectors of government. Partners should investigate which agreements have been ratified, and remind governments of their commitments. Other stakeholders should be informed of government commitments, and alliances can be formed to ensure government fulfilment of pledges.

The [Strategic Plan for Biodiversity 2011-2020](#), adopted at [Convention on Biological Diversity](#) (CBD) COP10 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 call for the mainstreaming of biodiversity across government, so that biodiversity values are integrated within sectoral plans and policies, and adverse effects can be minimised.

The [Convention on Migratory Species](#) (CMS) has passed a number of resolutions specifically related to migratory birds and wind energy, and of particular relevance to the region. CMS Resolution 7.5 on '[Wind turbines and migratory species](#)', adopted at the 7th meeting of the parties in 2002, calls on parties to identify areas where migratory species are vulnerable to wind turbines, and to use comprehensive strategic environmental assessment procedures to identify appropriate sites for development. Under the CMS, the [Agreement on the Conservation of African-Eurasian Migratory Water birds](#) (AEWA) Resolution 5.16, '[Renewable Energy and Migratory Water birds](#)' (2012), which calls for the development and strengthening of

national renewable energy planning, and for the developments to include monitoring in order to avoid and minimise the adverse effects of renewable energy installations, is of particular relevance for the region.

Resolution XI.10 of the [Ramsar Convention](#), adopted in 2012, on '[Wetlands and Energy Issues](#)', provides guidance on addressing the implications for wetlands of policies, plans and activities in the energy sector, stressing the need for integrated planning. Parties should be reminded of their commitments in this respect.

Both the CMS and Ramsar resolutions can be used as engagement 'hooks' with governments and national authorities, to demonstrate the need for the use of SEA and EIA, and Partners should communicate the need for the inclusion of ornithological concerns within these processes.

Donor organisations and development banks in particular, may fund many infrastructure projects within a country, including wind farms. Partners should engage with these organisations, and ensure that bird and biodiversity concerns are safeguarded within their project funding. The [Paris Declaration on Aid Effectiveness](#) highlighted as a priority helping countries meet their own environmental goals, which should include the international indicators they have agreed to, and additionally the mainstreaming of biodiversity within sectors. The [Accra Agenda for Action](#) highlighted and reinforced the need to support country environmental planning systems, including the use of EIA and SEA approaches, to increase in-country capacity in this regard, and to engage with civil society. Partners should seek to engage with donor organisations to ensure bird and biodiversity concerns are fully integrated into their decision-making processes.

Partners should seek to engage with the private sector, including developers and consultants, who may be looking for guidance on how to assess bird concerns appropriately, to influence siting of developments and mitigation actions. Developers and project funders should be reminded of their responsibilities to ensure their operations do not negatively impact the environment and threatened species.

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.