

**Fundamental Experiences and Suggestions
for Biotope-Management-Procedures on
International Airports**

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FUNDAMENTAL EXPERIENCES AND SUGGESTIONS FOR
BIOTOPE-MANAGEMENT-PROCEDURES ON INTERNATIONAL AIRPORTS

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Summary: In order to minimize birdstrike-risk Lufthansa German Airlines started a special ecological advisory program especially for airports in Asia, Africa, Middle and South-America serviced by DLH. This report deals with the experiences gained in countries with different climatic conditions which result in different types of birdstrike problems. Before this could be done it was necessary to study the special ecological situation in these areas, for only on the basis on such ecological investigation and consideration will it be possible to solve local bird hazard problems.

1. INTRODUCTION.

Every year Lufthansa German Airlines records more than 300 birdstrikes worldwide. Since each incident potentially causes a high amount of damage, not only German airports with their specially developed ecologically-based biotope programs for bird scaring, but also many airports, especially in the Far East and Africa, have been visited during the last 10 years to discuss birdstrike problems with airport authorities, institutes and regional biologists.

This report deals with the experiences gained in countries with different climatic conditions which result in different types of birdstrike problems. Before this could be done it was necessary to study the special ecological situation in these areas, for only on the basis of such ecological investigation and considerations will it be possible to solve local bird hazard problems.

2. BASIC INVESTIGATION PROGRAMS.

In various official and unofficial manuals (e.g. ICAO DOC 9137, Part 3) and regulation a large list of provisions for scaring birds on airports has been published; the impression may arise that, in following these recommendations or orders, all things have been done and all problems could be solved. Therefore it is very important to state, that it is a basic requirement for all measures on airports to have basic ecological research available if provisions are to be successful; the airports of Copenhagen and Manchester may be an example. This ecological research should be based on several years of investigations of all biotic and abiotic parameters and these investigations should be repeated every 4 or 5 years because the ecological situation on airports changes since ecological systems are dynamical and special ecological provisions for bird-scaring may change the situation. Moreover, it must be stated that all direct provisions against birds will always be effective only for a short time, and that the most effective and lasting method will be the biotope management which can only be based on ecological background research.

It is a fundamental biological rule, that it is impossible to create a vacuum in nature, therefore the ecosystem airport will always have a special avifauna depending on the special ecological situation on the airport itself, but this situation generally can be changed by a special biotope management, so that further development of the avifauna can be influenced for the benefit of flight safety. Some examples ! For the Frankfurt Airport a program for changing grassland to long grass usage has been developed which will solve the problems with crows, lapwings, starlings and birds of prey. In Hongkong Airport a sewage program related to the sea coast were under discussion and solved the problems with gulls; in Hamburg Airport a special scientific investigation has been carried out because of the problems with gulls and lapwings, and in Singapore and Jakarta-Cengkareng the ecological development of the airport areas is still in fluctuation, so that final recommendations are impossible to give, but ecological background research must now be carried out to influence these developments into a positive direction for flight safety. At Manila International and Kuala Lumpur-Subang as well as in the airports of Bombay, New Delhi and Bangkok relationships between grassland usage, monthly precipitation, temporary inundations, water capacity of the soils and birds appearance are of high relevance and require more years research before deciding on special procedures.

An airport is always a dynamic ecosystem which can be manipulated, so that e.g. large birds are scared, and at the same time small birds are attracted. It is

very important not to take measures against birds by inflexible programs which are to be valid for all airports of the region, but to develop flexible programs regarding the special local biological and ecological situation.

The basic investigation on each airport and in its vicinity should consist of:

- Statistical evaluation of birdstrikes and determination of bird remains after strikes coming from planes or runways. This requires a complete reporting system and exchange of birdstrike reports between air transport companies of all countries which make use of the airport in order to get information about the real degree of danger, the species of birds involved, their quantities depending on season and weather as well as their behaviour.
- Analysis of ecological facts, such as:
 - * Climatology for judgement of drainage necessities, inundations, growth of grassland and its mowing, as well as appearance of birds during short-scale, mesoscale, and long-distance migration. The types of migration can not be generalized, because the basic situation influencing the bird migration is different in each country of the world.
 - * Phenology of plants for judgement of seasonal food-supply for birds.
 - * Hydrology and soils for judgement of the ground-water regime and soil water capacity which is important for plant growth, and drainage provisions.
 - * Vegetation for judgement of food supply, breeding possibilities, and mowing methods, for plantations of shrubs and trees.
 - * Birds, residents and visitors in their seasonal fluctuations and local dependencies on other biotic and abiotic parameters.
 - * Other vertebrate and invertebrate animals in and on the soil/ground for judgement of food supply.

Only after such basic investigations directed provisions of biotope management or direct provisions, e.g. electroacoustical/pyroacoustical measures, should be concluded.

3. SPECIAL INVESTIGATION PROGRAMS.

The visit and ecological ratings on many airports showed some special problems which depend on the special climatological situation within the corresponding countries:

- a) Grassland use on airports: in Middle Europe many years of ornithological investigation led to the result that for the existing avifauna on the airports long-grass-use with cutting twice a year with or without removal of grass-material is used more than short-grass-use which is highly attractive for gulls, plovers, crows, starlings, thrushes and sparrows. Furthermore during the last years long-grass-use has been introduced on most airports and airfields and showed the following advantages:
 - * Reduction of birdstrike-risk by being less attractive for larger birds by supplying less food, being less attractive for birds of prey hunting small vertebrates because of a reduction in the offer of albumen. Possibly small insectivorous birds will be favoured because of the better development of flying insects in the long-grass-areas.

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- Improvement of the ecological situation by development of more natural plant societies, soil protection and good ecological circulation.
- Economic improvement by less cuttings, economization of fertilizers and reduction of costs.

In the tropic and subtropic zones long-grass-use is not comparable with long-grass in Europe; rain periods - caused by the passat- and monsoon-wind-systems - influence the possibility of cultivation and the fluctuation e.g. of soil arthropodes as well as of flying insects. Therefore special investigation programs should be carried out for several years with the aim of determining the best grassland cultivation methods with regard to the local composition of the avifauna. For one airport it may be recommendable to have long-grass-use without any cultivation for another occasional mowing might be better and for still another the short-grass-procedure should be applied.

The following investigations are proposed for the determination of the final grassland-use:

- Installation of test areas with long- and short-grass, observation of bird species and quantities, grass- and dicotyle-growth, soil vertebrates and invertebrates as well as flying insects by trapping, and observation of the physico-chemical situation of the soil under the existing cultivation conditions.
- Installation of test areas using growth inhibitors if permissible in order to reduce the number of yearly mowings.

b) Bird migration studies by radar and visual methods:

Outside Europe the migration situation is more complicated than within Europe where migratory birds are highly dependent on weather and phenological situation of the vegetation.

In all region of the world different migratory types exist. Therefore special observation programs could be helpful as a basis for the development of special warning/forecasting procedures for airport districts, too. Such programs should be based on radar and visual observations and could help to draw up probability analyses.

- c) Bird migration and weather: the interaction between migrant birds and weather or meteorological parameters differs dependent on migration type. Transzonal migrations are controlled by weather and instinct; for the regional and local migrants - important for airport districts - only supply of food, position of roosting and feeding places, upcoming thunderstorms as well as tides are highly important.

Correlations between weather and bird movements are only possible by comparing corresponding data over many years and by developing computer programs.

4. FUTURE ACTIVITIES.

Ten years ago Lufthansa German Airlines developed a special advisory program which is made available free of costs especially to airports serviced by Lufthansa in Africa, Asia, Middle and South-America which are interested to utilize the more than 20 years of experience with the bird hazard problem. This program has been carried out together with biologists of die Birdstrike Committee Germany and refers to more than 30 airports in Europe, Asia, and Africa. It goes without saying that this type of advisory cannot and will not replace a detailed and dif-

ferentiated ecological analysis, but it can and will be a rating and a guideline for the countries which have a lack of experience. The development of birdstrikes encountered by Lufthansa German Airlines especially in some regions of Africa and Asia shows that flight safety tendencies are improving, but these tendencies must be observed over longer periods in order to reach final judgements.

5. LITERATURE.

- Brough, T. (1983) : Die Wirksamkeit von langem Gras als Vogelvergrämungsmittel auf Flugplätzen. Vogel und Luftverkehr 2:78-84.
- Dahl, H. (1985) : Vorschriften über das Flughafenmanagement zur Vogelschlagverhütung auf dänischen Flugplätzen. Vogel und Luftverkehr 1:3-7.
- Hild, J. (1979-1987) : The birdstrike problem on the airports of Dakar, Nairobi, Peking, New Delhi, Bangkok, Bombay, Singapur, Jakarta, Karachi, Islamabad-Rawalpindi, Lahore, Manila, Kuala-Lumpur and Mexico. Ecological Rating - Consequences - Recommendations. Report by order of Lufthansa German Airlines. Traben-Trarbach.
- Hild, J. (1983) : Combating birdstrike hazard. Airport Forum 5-6.
- Hild, J. (1985) : Biotope management for birdstrike control. Airport Forum 6.
- Hild, J. (1986) : Vogelschlagstatistik Zivile Luftfahrt. Mannheimer Protokolle 7. Heidelberg.
- Hild, J. (1988) : Ökologische Grundlagen des Vogelauftretens auf Flughäfen/Flugplätzen. Mannheimer Protokolle 7. Heidelberg.
- Hild, J. und Küsters, E. (1988) : Biotopmanagement in den Bauschutzbereichen von Flughäfen/Flugplätzen. Mannheimer Protokolle 7. Heidelberg.
- Hoffmann, O. und Schabram, W. : Vogelschlagstatistik Deutsche Zivilluftfahrt 1981-1987. Vogel und Luftverkehr 1981-1987.
- Milsom, T.P. (1985) : Untersuchungen über Kiebitze in Flughafenbereichen. Vogel und Luftverkehr 1: 21-26.
- Rooseleer, G. (1982) : Tägliche Bewegungen von Lachmöwen im Bereich des Brüsseler Flughafens. Vogel und Luftverkehr 1:8-11; 2:78-84.
- Sindern, C. (1988) : Flughafenplanung unter Vogelschlaggesichtspunkten am Beispiel des Flughafens München 2. Mannheimer Protokolle 7.
- Birdstrikes Statistics Lufthansa German Airlines 1966-1987. Ed. DELVAG Köln.
- Guidelines for Birdstrike Prevention in German Forces. Ministry of Defence. Vogel und Luftverkehr 1/82: 3-7.
- Guideline for Birdstrike Prevention in German Civil Aviation. Ministry of Transport. Vogel und Luftverkehr 2/81: 65-70.