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Technical specification for wetland ecological risk assessment

湿地生态风险评估技术规范

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1 Scope

This document specifies the technical requirements for the assessment of the ecological status of a wetland, of the degree to which it is threatened, of the effectiveness of its management and of its ecological risk grade, as well as for the ecological risk analysis and monitoring of development and utilization construction projects.

This document applies to wetland ecological risk assessment, and also to the assessment of the effect of development and utilization construction projects on wetland ecological risk.

3 Terms and definitions

3.1 wetland ecological risk: the possibility that the wetland ecosystem, acted upon by an external or internal threat or carrying a potential threatening factor, undergoes a change in its ecological status that endangers the health of the wetland ecosystem. The wetland referred to in this document is the wetland as defined by the Wetland Protection Law of the People's Republic of China. Note: wetland ecological risk arises from three sides, the ecological status of the wetland itself, the extent to which the wetland is threatened and the effectiveness of wetland management. At present a development and utilization construction project is a common case of a threat to the health of a wetland ecosystem.

3.2 wetland ecological status: the state of the components, processes and services that make up the wetland ecosystem, at the corresponding scale of time and space.

3.3 natural wetland ratio: the proportion of wetland undisturbed by human activity in the total wetland area.

3.4 wetland indicator species: a biological species of a particular wetland habitat.

3.5 threatening factor to wetland: a factor that has a negative effect on, or poses a potential threat to, the health of the wetland ecosystem.

3.6 wetland vegetation suitable area: the area of wetland suitable for the growth of aquatic and hygrophilous plants and for the formation of a stable plant community.

3.7 threatening degree of wetland: the graded state that reflects the extent of change in a wetland when it is acted upon by a threat.

3.8 wetland ecological risk degree: the graded state that reflects the extent of the ecological risk of a wetland. Note: four colours, red, orange, yellow and blue, from high to low, stand for the major risk, greater risk, general risk and low risk grades of wetland ecological risk.

4 General requirements

The assessment method shall meet the following requirements. a) Quantitative and qualitative assessment are combined: the natural wetland ratio, the vegetation cover, the

wetland protection ratio, the water quality and similar indicators are assessed quantitatively, while the hydrological indicators and the management effectiveness indicators other than the wetland protection ratio are assessed by qualitative description. b) The choice of assessment site, the setting out of survey lines or plots, the taking of samples and the collection of material shall follow the technical rules or standards for wetland survey and monitoring. c) In the assessment of the ecological status and of the degree of threat, one and the same indicator may be used only once within a single assessment and shall not be used again; at the same time, the omission of a key indicator, which would change the result, is to be avoided. d) An objective and impartial attitude shall run through the whole assessment, from the collection of material, remote sensing diagnosis, field survey and verification, and data processing and analysis, to the drafting of the report. e) With a view to strengthening wetland protection, this document follows in the choice of indicators, the determination of types and the determination of results the principle of taking the more severe of any two, that is, of choosing as the result the one item that gives the highest wetland ecological risk grade.

The object of assessment is the wetland patch, which is the basic unit for carrying out wetland ecological risk assessment.

For the assessment of the ecological status, the season that best reflects the indicators objectively is chosen; for the assessment of the degree of threat, the season in which the threatening factor is present or potentially present and produces a marked effect is chosen; for the assessment of management effectiveness the period is not restricted and the assessment year applies.

A reference object is chosen as needed for comparison in the assessment of the degree of threat. a) Where a time series substitution is used, a wetland in good condition at an earlier time serves as the reference, relevant material or information is collected, and the assessment year is compared with that earlier time, this being the time substitution method; the earlier time should be one of the years five or more years before the assessment year. b) Where a geographical substitution is used, a well preserved wetland of the same type nearby serves as the reference and relevant material or information is collected for a lateral comparison, this being the space substitution method. c) Where both the time substitution and the space substitution methods are used, the one giving the more severe degree of threat shall be taken as the result.

Wetland ecological risk assessment combines the three risk assessments of ecological status, degree of threat and management effectiveness. Where a wetland development and utilization construction project is involved, the content on ecological risk analysis and monitoring of construction projects is added.

5 Risk assessment of the ecological status

Assessment indicators. The indicators consist of six first-level indicators and fifteen

second-level indicators, set out in Table 1. The first-level indicators are the natural wetland ratio, the vegetation cover, the coefficient of variation of the wetland indicator species and of the natural resource stock, the proportion of the area affected by harmful organisms, the hydrology and the water quality; the natural wetland ratio, the indicator species, the proportion of area affected by harmful organisms, the hydrology and the water quality are marked as mandatory indicators. The second-level indicators are the total wetland area, the natural wetland area, the wetland vegetation area and the area suitable for wetland vegetation, all in hectares and obtained by data collection, remote sensing diagnosis, field survey and verification; the number of species, the population size in head, individuals or the like per hectare, the biomass in kilograms per hectare, the standing timber volume in cubic metres per hectare, the fresh grass yield in kilograms per hectare and, for peat swamps, the thickness of the peat layer in centimetres, which is a mandatory second-level indicator for that type; the total area affected by harmful organisms during the year and the total wetland area, both in hectares; the state of water supply, the state of standing water and the state of water outflow; and the water quality of surface water, groundwater or sea water expressed as class I to class V.

Data acquisition. The data for the second-level indicators and for the water quality of the assessment year are obtained by the collection of material, remote sensing diagnosis, field survey or laboratory analysis of samples. Apart from the water quality indicator, the first-level indicators are obtained by sorting, analysing or calculating the second-level indicators. Data on harmful organisms shall be obtained in accordance with LY/T 1681 and LY/T 2516; surface water quality data in accordance with GB 3838; groundwater quality data in accordance with GB/T 14848 and HJ 164; and sea water quality data in accordance with SL 219 and GB 17378 (all parts).

Qualitative description of the hydrological indicators. The state of water supply falls into four classes: permanent supply with sufficient water, seasonal supply with sufficient water, seasonal supply with insufficient water, and intermittent supply with insufficient water. The state of standing water falls into four classes: permanent standing water, seasonal standing water, intermittent standing water and dried up. The state of water outflow falls into four classes: permanent outflow, seasonal outflow, intermittent outflow and no flow.

Calculation of the first-level indicators. The natural wetland ratio C_1 is calculated by formula (1) as the total natural wetland area S_n divided by the total wetland area S_s , expressed as a percentage, both areas being in hectares. The vegetation cover C_2 is calculated by formula (2) as the wetland vegetation cover area P_n divided by the area suitable for wetland vegetation P_s , expressed as a percentage. The proportion of area affected by harmful organisms C_3 is calculated by formula (3) as the total area of the wetland actually affected by harmful organisms during the year Q_n divided by the total wetland area Q_s , expressed as a percentage. The coefficient of variation of the wetland indicator species and of the natural resource stock C_4 is calculated by formulas (4) to (6) as the standard deviation S_d divided by the mean M_s , expressed as a percentage, where one of the second-level