

快北水工招在招南



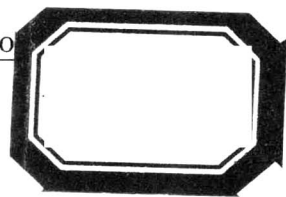
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ABSTRACT

引言

这些指导方针提供了关于用于治理城市污水的人工湿地的计划，设计，建设和实施。

人工湿地的处理，监测和成本也包含在这些指导方针。这些指导方针的内容是基于 Dr. Maria da Conceicao Corvaceira Fidalgo de Matos. 博士后工作的一部分而研究的。这些指导方针集中于研究 FWS 湿地。这些系统有高于湿地床或者底层的水面。可供选择的系统包括 SSF 湿地被简要介绍。在 SSF 湿地，废水通过一个多孔渗水的媒介诸如砂砾或粗砂流出。FWS and SSF 人工湿地的基本结构显示在图 1.1。这些指导方针不包含用于治理雨水，矿井水排泄或工业废水的湿地设计，这由另外两本是同一作者的书介绍。人工湿地这个术语已经被用于报告中，优先于可供选择的术语包括人造湿地。

指导方针简要

1. 介绍

概要：提供报告内容的总的看法。关键点：报告包括用于治理城市污水的 FWS 湿地。云南已被分成三个气候区域来论述被期望跨越省份的湿地设计和管理方面的范围。云南已被分成三个气候区域来论述被期望跨越省份的湿地设计和管理方面的范围。

2. 用于废水治理的湿地利用

概要：描述了云南现存湿地的一个详细目录和早先的昆明理工大学国土资源工程学院用于治理水污染控制项目的人造湿地的一部分。关键点：它被认为是 FWS 湿地把城市污水致力到高标准的功能。关键点：它被认为是 FWS 湿地把城市污水致力到高标准的功能。

3. 湿地处理

概要：描述了湿地中关键的物理的，化学的和生物的处理和污染物处理的主要机制。关键点：废水被保留在人工湿地中的滞留时间是各种采用的治理过程中很关键的。水平衡分析通常要求估计在人工湿地中的滞留时间。人工湿地中的治理过程是很复杂的。有关对悬浮固体物，生化需氧量，氮，磷和病原体的机制和路径的描述在 3.3 到 3.7 节中介绍。这段细节被提供用来对关键过程和他们通过适当的湿地设计怎么被优化的一个基础理解。厌氧或有氧的条件的存在，大型植物，biofilms 和弄湿以及烘干循环是重要影响大范围处理过程的重要因素。

4. 湿地计划

Outline 概要

第四章 湿地计划

概要：描述对使用湿地，地址方面，立法要求和排水道再利用的时机做决定。Key Points:关键点

对人工湿地地址的选择需要考虑众多因素包括土地的可用性，城镇计划区域，治理目标，地址的获得，主要的风向，地表和地下水文学，地形学，土壤，缓冲地带和洪灾保护区域。对人工湿地的发展批准包括在云南综合计划下的计划批准，计划方案，环境保护法案下的环境批准和众多自然资源和遗产批准。这些被申请的批准依据所建议的人工湿地的具体环境从一个项目到一个项目都有所不同。从人工湿地中处理过的排水道用多种方法被重新利用包括灌溉，建立蓄成池的水质。建造的湿地的新兴的应用为鱼和鱼食料包括 lemna(浮萍)生产，为水产养殖工业，鱼食料生产，浮游动物和甲壳动物处理再循环的水。人工湿地是以在治理过程中的表现的可变性为条件的自然系统。如果一贯需要底排水道集中，那么人工湿地的采用不是一个可靠的选择。

5. 设计原则概要

第五章—设计原则概要：描述了对湿地范围，几何学，区域和植物的选择的好的设计惯例。

设计的边缘方面，进口和出口，可选择的设计改概要包括可使用的地下表面湿地的设计而不是诸如野生动植物的生活环境，可以看见的礼仪和公共教育的处理。

Key Points:关键点

国际惯例中对 FWS 湿地范围最权威的认可是 the Reed Method and the Kadlec and Knight Method.

人工湿地中的生化需氧量应该少于 75 kg BOD/ha/day. 多种处理原则可以用来估计在云南的可预示的湿地范围。一份包含广泛的水生植物的清单可以用来帮助在云南多种气候区域中选择湿地植物。对人工湿地的工程设计必须说明被选植物的特征。在人工湿地应该采用多种植物而不是单一植物。人工湿地也能被用来当作野生动植物的生活环境，提供一种有吸引力的可视的特征和公众教育和被动的娱乐。这些用途中一些也许会于废水治理的目标相冲突。

6. 建设原则概要

第六章——建设原则概要：包含了关键的建设问题诸如地址的选择，底土层的适用性，市民的工作和建设顺序。描述了植被的建立。

Key Points:关键点

粘土邮船(或者其它的措施)应该被安置并且很好地紧密结合使渗漏的渗入地下水减到最小。湿地的底层应该被垦松来帮助植被的建立，应该避免对底层使用肥料。在植被的建立期间，水的高度应该终保持在自然生长植物的高度以下。有代表的高度视低于 150 mm depth. 植被的密度从每平方米 1 到 10 棵有所不同。对自然生长的植被布局形式包括边缘植物（横跨湿地）和与湿地边缘平行的植物。

7. 实施原则概要

第七章——实施原则

概要：包括了水平面管理，植物收获和杂草，蚊子和害虫，海藻，气味和有毒物质的积累的控制。关键点：

改变水深度的能力是建造人工湿地的关键。设计应该考虑到水深度从零到大型植物所能容忍的最大的深度，一般来说不会超过 0.6 米。收割植物尤其是那些自然生长的种类的主要好处，是将有利于作物的生长，降低作物的浓度和抑制繁茂植物的生长。如果植物被收割，来自湿地的一些营养的将发生移动。在通常的大型植物组织内的营养贮存少于大约 20%，但是这主要取决于植物的类型，种植和收割的时期。有时候，储存在植物中的生物的营养物可以占到大约在湿地内的营养物的 60%。植物收割的缺点包括高费用，一些

8. 湿地的监测

第八章 湿地的监测

概要：包括技术监控处理性能和湿地的物理状态。

关键点：

因为云南在地理上是拥有很大的面积，所以省内的不同地方气候有很大的变化。为了具有一定的指导意义，下列已经被使用的区域是基于气象局绘制的气候区域图。每个区域的气候特征被显示在 1.2.云南气候区域图上。

每种区域气候的特性将影响湿地的设计和操作，正如表格 1.1.云南气候区域——人工湿地的建造所显示的那样。

GUIDES FOR LAND AND WATER IMPROVEMENT OF DIANCHI

主题词

KEY WORDS

人工湿地

constructed wetlands

水污染治理

water pollution improvement

面源污染

diffuse pollution

土地污染治理

soil pollution improvement

滇池

Dainchi lake

昆明

Kunming

NOMENCLATURE

Biocides and Organic compounds identified by their Geneva names

International Code of Botanical Nomenclature

International Code of Nomenclature of Bacteria

International Code of Zoological Nomenclature

International Union of Pure and Applied Chemistry

IUPAC – IUB Combined Commission on Biochemical Nomenclature

SI units

SYMBOLS

a = wetland roughness factor

A = wetland surface area

C^* = background pollutant concentration in wetland

C_i = influent pollutant concentration at wetland inlet

C_o = effluent pollutant concentration at wetland outlet

d = water depth in wetland

d_i = water depth at wetland inlet

d_o = water depth at wetland outlet

dv/dt = change in water volume per unit of time

ET = evapotranspiration

HLR = hydraulic loading rate

I = infiltration

k = first order areal rate constant

K_p = first order phosphorus reaction rate constant

K_R = rate constant at 20° C reference temperature

K_T = reaction rate constant corresponding to water temperature in wetland

L = wetland length

M_1 = loading parameter

n = Manning's roughness coefficient (Hydraulics)

nc = number of wetland cells in series

n_v = void ratio or porosity, corresponding to the space available in wetland for water to flow through

O_R = temperature coefficient for rate constant

P = precipitation

Q_{av} = average discharge through wetland

- Q_{bf} = median baseflow through wetland
 Q_i = influent wastewater flow into wetland
 Q_m = minimum discharge capacity
 Q_o = effluent wastewater flow out of wetland
 R = runoff into wetland
 S = hydraulic gradient or wetland bed slope
 S_1 = slope parameter
 t = detention time
 T_d = time to drain surcharge volume
 T_w = wetland temperature
 V_d = surcharge volume

ABBREVIATIONS

- Al** – Aluminium
BMP – Best Management Practice
BNR - Biological Nutrient Removal
BOD - Biochemical Oxygen Demand
C - Carbon
C:N:P - Carbon, Nitrogen and Phosphorus ratio
CAMBA – China/Australia Migratory Bird Agreement
CFU - Coliform Forming Unit
CH₄ - Methane
CO₂ - Carbon Dioxide
COD - Chemical Oxygen Demand
CP - Coarse Particulates

- CS** - Chinese Standard
- CSTR** - Continuously Stirred Tank Reactor
- Cu** - Copper
- DAB** – Dianchi Administration Bureau
- DM** - Dissolved Matter
- DNRA** - Dissimilatory Nitrate Reduction to Ammonium
- DON** - Dissolved Organic Nitrogen
- DOP** - Dissolved Organic Phosphorus
- DP** – Difuse Pollution
- Ecoli* - Escherichia coli bacteria
- EP** - Equivalent Population
- EPP** - Environmental Protection Policy
- Fe²⁺** - Ferrous Iron
- Fe³⁺** - Ferric Iron
- FLR** - Faculty of Land Resources
- FP** - Fine Particulates
- Free Water Surface (FWS) Wetlands** - these systems have the water surface above the wetland bed or substrate.
- FRP** - Filterable Reactive Phosphorus
- FWS** - Free Water Surface
- Ge** - Germanium
- H₂** - Hydrogen gas
- H₂O** - Water
- IDAS** - Integrated Development Assessment System
- IWA** – International Water Association
- KCIRCP** – Kunming China International Research Center for Plateau
- KEMC** – Kunming Environmental Monitoring Center

KEPB - Kunming Environmental Protection Bureau

KMC – Kunming Medical College

KMG – Kunming Municipal Government (Kunming Municipality)

KUST –Kunming University of Science and Technology

LP - Large Pathogens

M - Manganese

mg/L - milligrams per liter

N - Nitrogen

N₂ - Nitrogen gas

NADB - North American Wetland Treatment System Database

NH₃ - Ammonia gas

NH₄ - Ammonium

NO₂ - Nitrite

NO₃ - Nitrate

NPS - Nonpoint Source Pollution

O&M - Operation and Maintenance

O₂ - Oxygen gas

P – Phosphorus

P1 - noxious plant category

P2 - noxious plant category

P3 - noxious plant category

P4 - noxious plant category

P5 - noxious plant category that should be controlled only on land under the control of a Local Government

Pb - Lead

PM - Particulate Matter

PO₄ - Orthophosphate

PON - Particulate Organic Nitrogen

POP - Particulate Organic Phosphorus

RAMSAR - Ramsar Convention on Wetlands of International Importance(1971)

SP - Small Pathogens

spp - Species

SS - Suspended Solids

SSF - Sub Surface Flow

Sub-Surface Flow (SSF) - in SSF wetlands

SWS – Society of Wetland Scientists

TDS - Total Dissolved Solids

UV - Ultra Violet

YEPB – Yunnan Environmental Protection Bureau

YG – Yunnan Governement

YIES – Yunnan Institute of Environmental Sciences

Zn – Zinc

GLOSSARY

Acid Sulfate Soils – are soils which contain pyritic materials, commonly iron sulfide. Sulfuric acid can be generated if these soils are disturbed and exposed to oxygen.

Adhesion – deposition of small particles onto a surface, e.g. sediments onto macrophyte leaves.

Adsorption – the adherence of a gas, liquid or dissolved chemical to the surface of a solid, eg sediment particle.

Aerobic – a state where free oxygen (O₂) is available.

Aesthetic – visual attractiveness or beauty of a site.

Aggregation – process whereby small particles cluster together due to particle attraction forces.

Algae – a group of single cell or multi-cell plants that typically grow in water.

Alleopathy – the natural interaction of plants with other organisms in their environment through the release of chemicals to their environment. The interactions may be both positive or negative, but the most common use of the term is for negative interactions.

Anaerobic – a state where neither free oxygen nor oxygen bound to other molecules are available.

Anoxic – a state where there is no free oxygen, but oxygen bound to other molecules is available.

Artificial Wetlands – see Constructed Wetland. This term is becoming less favoured as it implies the use of artificial or synthetic materials, which is generally not the case in wetland construction.

Aspect Ratio – the ratio of the wetland length to its width.

Asset Life – the period of time that a system will reliably perform its function.

Autotrophic – the production of organic carbon from inorganic chemicals. Photosynthesis is an example of an autotrophic process.

Benthic – occurs on or in the bottom sediments of a wetland.

Biodiversity – see Diversity.

Biofilm – an organic layer, typically composing of algae, microfauna and bacteria, which adsorb small particles (colloids) and nutrients. Biofilms are an important treatment component within constructed wetlands.

Biomass – the living weight of plants or animals.

Blue-green Algae – see Cyanobacteria.

BMP – A single measure, procedure or structure to control an aspect of diffuse pollution (plural BMPs)

BOD – Biochemical Oxygen Demand is a measure of the oxygen consumed during bacterial breakdown of organic matter in water.

Brackish – water that contains a TDS concentration greater than 500 mg/L.

Climatic – data relating to the climate of a region.

Constructed Wetland – a wetland that has been purpose built to achieve a set of design objectives. Constructed wetlands apply the functions of natural wetlands and utilise soil, water and biota processes to achieve these objectives.

Continuously Stirred Tank Reactor – type of flow assumption used in wetland modelling whereby it is assumed that fluid particles are well mixed.

Cyanobacteria – primitive, photosynthetic bacteria occurring as single cells or in filaments.

Denitrification – process of reducing nitrate or nitrite to nitrogen gas, in the absence of freely available oxygen.

Design criteria – the design standards set by the planners and regulators, normally in discussion with the developer, that the proposed surface water drainage system may satisfy.

Desorption – the release back into solution of substances that have been previously adsorbed onto a surface.

Detention basin – a dry basin designed to temporarily store and attenuate surface water peak flows.

Detention Time – the average period of time that effluent is detained within the wetland. Water treatment processes are dependent, amongst other factors, on the period of time that wastewater physically resides within the wetland. This period of time is known as Detention Time, but is also commonly referred to as Hydraulic Residence Time, or Retention Time.

Detritus – dead plant material that is in the process of microbial decomposition.

Diatom – single cell algae with a silica skeleton.

Diffuse pollution – pollution arising from land-use activities (urban and rural) that are dispersed across a catchment or subcatchment, and do not arise as a process industrial effluent, municipal sewage effluent, deep mine or farm effluent discharge.

Dinoflagellellate – single cell algae characterised by two flagella.

Diversion terraces – An erosion-control system comprising a series of shallow broad-based ditches across fields designed to reduce the volume of surface stormwater runoff by breaking the slope into shorter lengths.

Diversity – the number and distribution of animal or plant species within a defined area.

Drainage system network – the network of swales, channels, drainpipes, filter drains and trenches, incorporating SUDS control and treatment devices to collect, manage and convey surface water run-off through and out of the development site.

Effluent – a liquid that flows out of a process or treatment system.

Eh – a measure of redox potential, (oxidation-reduction potential) expressed in volts, using an electrochemical cell. See also Redox, Oxidation and Reduction.

Emergent Plants – are plants that are attached to the substrate and whose leaves and stems either float or protrude above the surface.

Ephemeral – systems which have water present only periodically.

Epiphytic Algae – are algae that are attached to the surfaces of other plants.

EQS – Environmental quality standards

Equivalent Population – the total number of persons who would contribute the same quantity and/or quality of domestic sewage as the wastewater load being considered.

Euglenaphyte – type of single cell algae, usually with one flagella.

Extended detention basin – a detention basin where the outflow control is restricted beyond that allowed purely for attenuation so that the surface water run-off is detained longer allowing for some increased removal of particulate pollutants by settlement.

Filter drain – basically a liner trench filled with granular filter material, usually with a perforated drain, in the bottom of the trench.

First flush run-off – as the name implies, this is the first part of the surface water run-off. Over and effectively wash the development surfaces in the early stages of a storm event. Therefore tends to have more concentration of pollutants than the remainder of the surface water run-off.

First Order Reaction – reactions where the rate of disappearance or production of a particular component is directly proportional to its available concentration.

Fixation – the conversion of nitrogen gas to ammonia by a select group of bacteria and cyanobacteria.

Flawra – Ej Strips – Wetland plants that have been established on a reinforced strip. Main application is wetland planting in deep or high velocity conditions.

Flood risk assessment – a formalized report investigating the potential for flooding both within the development and upstream and downstream of it.

Floodplain – an area of low-lying land adjacent to a burn, stream or river, which is liable to regular flooding when the flow in the burn, stream or river exceeds its capacity.

Flow control devices – There are generally mechanical devices such as restricted orifice plates and pipes, slotted and V-notch weirs, perforated risers and proprietary