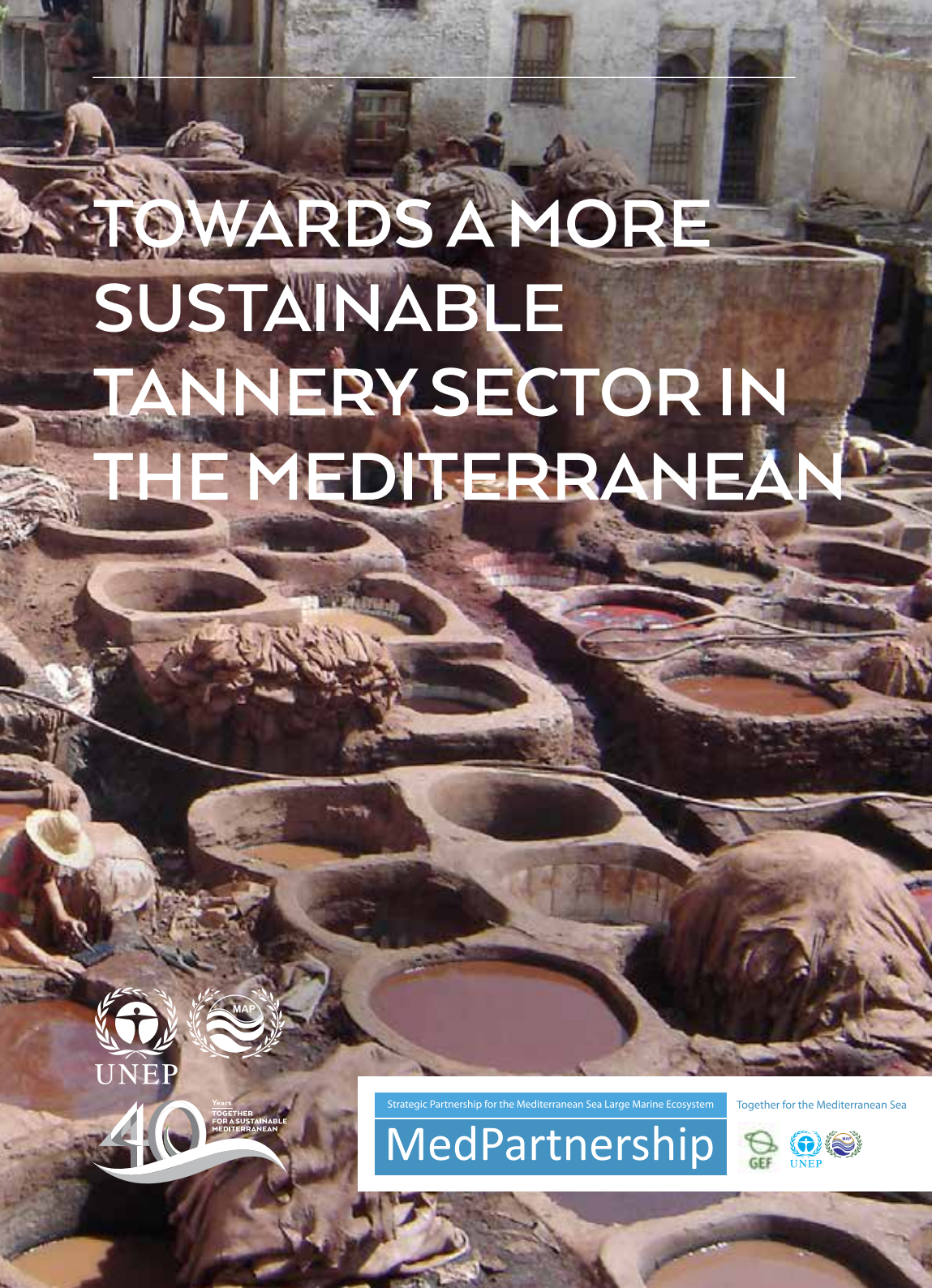

TOWARDS A MORE SUSTAINABLE TANNERY SECTOR IN THE MEDITERRANEAN

UNEP

MAP

40 Years TOGETHER FOR A SUSTAINABLE MEDITERRANEAN

Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem

MedPartnership

Together for the Mediterranean Sea

GEF UNEP

TOWARDS A MORE SUSTAINABLE TANNERY SECTOR IN THE MEDITERRANEAN

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Towards a more Sustainable Tannery Sector in the Mediterranean

These Guidelines have been commissioned by the marine pollution assessment and control unit (MED POL) of the Mediterranean Action Plan (UNEP/MAP) to the Regional Activity Centre for Sustainable Consumption and Production (SCP/RAC) under the MedPartnership Project.

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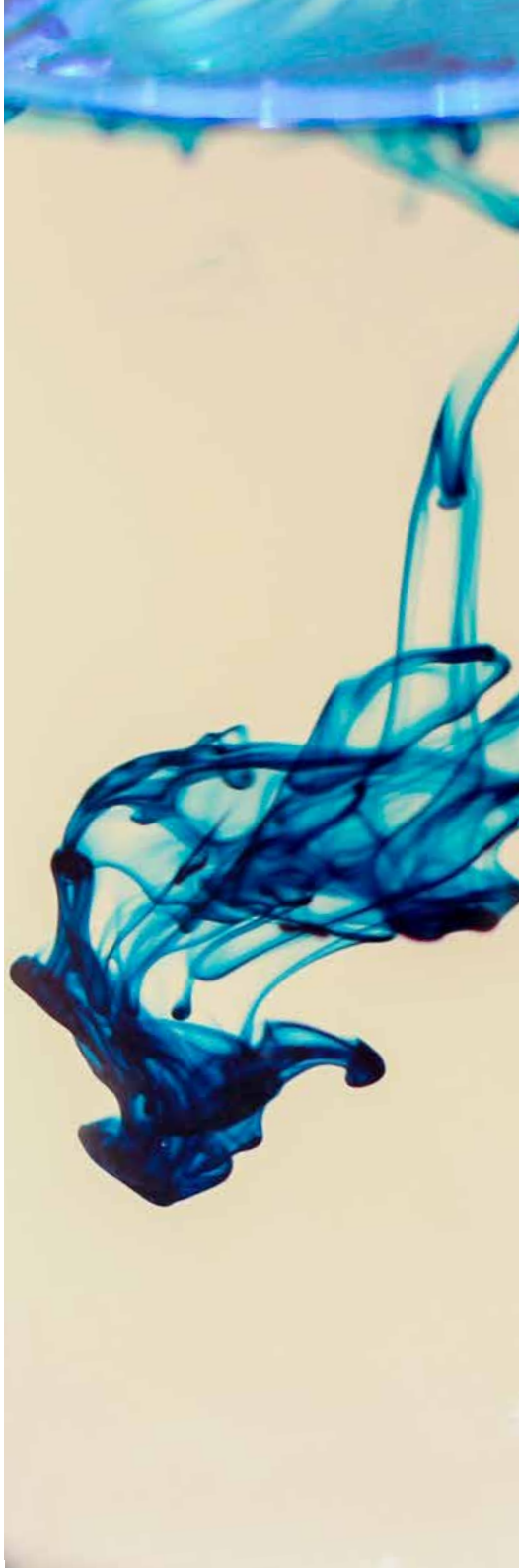

PREFACE

This technical guide is focused on providing updated pollution prevention options and specifically priority or immediate actions in the tanning industry in Mediterranean countries, although it can be applied worldwide. Its ultimate objective is to provide these countries with information in order to establish a minimum set of pollution prevention actions, referred to as "the 10 most immediate pollution prevention options" in the tanning sector that can lower the environmental and human health impact of the industry at a cost-effective level for the private sector.

The guide has been developed by the Regional Activity Centre for Sustainable Consumption and Production (SCP/RAC) in collaboration with UNEP/MAP MED POL Programme, under the MedPartnership project[1]. This document is also an update or extension work of the study developed by the SCP/RAC in the year 2000 called "Pollution prevention opportunities in the Tanning sector industry within the Mediterranean region".

The environmental impact of tanneries refers to: Water consumption, impact on surface and groundwater, impact on land, impact on air, and impact on waste management systems. It might vary depending on the quality and quantity of generated pollution and the proximity of contaminant effluents to "receptors" (humans, plants, animals or ecosystems exposed to pollutants). Sensitive receptors include, for example, hospitals, schools, daycare facilities, elderly housing and convalescent facilities as well as ecosystems. These are areas more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants.

This technical guide provides information on alternatives to leather that can prevent the environmental and human health impact while promoting local employment and sustainable economic opportunities, and summarises associated environmental problems caused by the tanning sector in the air, water and soil vectors and main generated pollutants. It also describes some available tools to implement a sustainability policy in the tanning sector companies as well as the 10 most cost-effective pollution prevention actions needed to increase the sector efficiency and lower the environmental and human health impact of the tanning sector, especially in developing countries of the Mediterranean region. Finally it shows several case studies on pollution prevention opportunities, more sustainable companies and other cases in the tanning sector.

This guide aims at facilitating policy and legislation reforms for pollution prevention and control. It seeks to develop and improve the legislative and institutional framework in the Mediterranean region and to serve as a technical guidance for the Mediterranean countries in implementing the relevant priority actions of the National Action Plans adopted in the framework of Article 5 and 15 of the LBS Protocol of the Barcelona Convention and its Strategic Action Programme SAP-MED.

1. The Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem (MedPartnership) is a collective effort of leading organizations (regional, international, nongovernmental, etc.) and countries sharing the Mediterranean Sea towards the protection of the marine and coastal environment of the Mediterranean. The MedPartnership is being led by United Nations Environment Programme (UNEP) Mediterranean Action Plan (MAP) and the World Bank and is financially supported by the Global Environment Facility (GEF), and other donors, including the European Union (EU) and all participating countries.

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INTRODUCTION

1.1. Contents of the guide

This technical guide has been structured to show a minimum set of pollution prevention actions for the tanning sector that are crucial to lower the environmental and human health impact, easily implemented and at an affordable cost in any Mediterranean country.

Chapter 1 provides background information, the scope of the document and information on alternatives to leather that can prevent the environmental and human health impact while promoting local employment and sustainable economic opportunities.

Chapter 2 provides a summary of the associated environmental problems caused by the tanning sector in the air, water and soil vectors and main generated pollutants.

Chapter 3 describes a summary of some available tools to implement a sustainability policy in the tanning sector companies.

Chapter 4 first describes the 10 most cost-effective pollution prevention actions needed to increase the sector efficiency and lower the environmental and human health impact of the tanning sector, especially in developing countries of the Mediterranean region. Then the chapter provides a summary of most pollution prevention opportunities in the tanning sector.

Chapter 5 shows several case studies on pollution prevention opportunities, more sustainable companies and other cases in the tanning sector.

1.2. Prevention of pollution: Alternatives to leather

There are plenty of alternatives to leather that clearly consume less resources, water, energy and dangerous chemicals for its production per ton of leather or alternative product along its life cycle, including a reduction in its CO2 footprint.

Alternatives to leather might include plant-based textiles and leather products and petroleum-based textiles and leather.

Plant-based textiles and leather are renewable, biodegradable and non-toxic and are also an appealing opportunity for green entrepreneurship, especially in the increasingly demanding European market for green products. Local renewable resources might be used as materials to produce green alternatives to leather to lower costs, generate local employment, social benefits, sustainable economic activity and prevent pollution and human health problems. In this regard, please check the case study on Ecozap shoes in the case studies section of this document.

These bio-based materials used as a

substitute of leather might be made of cotton, cork, kelp (ocean leather), hemp, jute, palm, palm-tree, seeds, organic cotton, natural latex, fiber of coconut, rind of rice, wood, sap of tree, bamboo, pure 100 % un-bleached and un-dyed natural wool, pineapple fibers, etc.

On the other hand, petroleum-based textiles and leather might be less interesting from the sustainability point, since these products are not coming from renewable sources and cannot be considered as environmentally friendly. Petroleum-based textiles and leather might also be considered of high impact since they are non-renewable and produced with harmful substances such as polyvinyl chloride (PVC) and others. Some examples of petroleum-based leather might include poromeric imitation leathers (polyurethane plus polyester), corfam, leatherette, koskin, etc.

TANNERIES AND THE ENVIRONMENT

2.1. Introduction

The environmental impact of tanneries might vary depending on the quality and quantity of generated pollution and the proximity of contaminant effluents to "receptors" (humans, plants, animals or ecosystems exposed to pollutants). Sensitive receptors include, for example, hospitals, schools, daycare facilities, elderly housing and convalescent facilities as well as ecosystems. These are areas more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants.

When auditing an industrial site or tannery, it is important first to know the quality and quantity of pollutants being released into the environment and second, the type and proximity of receptors, in order to established a pollution prevention strategy to lower or eliminate the impact on them.

2.2. Water consumption

Water is a limited resource worldwide. The already existing water shortage in the Mediterranean is expected to grow in the future as water demand increases and climate change affects the availability of water. In addition, water pollution is also threatening the accessibility to good quality water due to poor waste water treatment, disposal and other pollution sources.

Managing water resources in a sustainable manner is crucial for the future of the Mediterranean basin. There is an urgent need to manage scarce water resources sustainably. Accurate water accountability is needed to know sources and uses of water, water flows, water stocks and services, for wise decision making to solve the problem.

Within the industrial sector, the tanning sector is considered a large consumer of water and heavy polluting industry. Water used may come from rivers, groundwater, municipal supply or from private-owned sources. High consumption of water and increased levels of environmental pollution deteriorate water quality, thus decreasing the amounts available for human consumption and other uses. This improper management of water resources is causing in some places scarcity of clean water and high human risk for local population and ecosystems.

Water consumption in the tanning sector includes process water, and also technical water which is needed for cleaning, energy use, waste water treatment, and sanitary purposes. Process water consumption varies greatly from tannery to tannery, depending on used technology, processes involved, raw material used, and manufactured products, but accounts for about 80% of the total water consumption. Technical water accounts about for the other 20% of total water consumption.

Water consumption significantly varies between tanneries and type of hides, but on average, is usually between 25 to 80 m3 per ton of hides. Minimum water use including process and technical water might be as low as 12 to 25 m3 per ton of hides, so there is an important room for improvement in the global tanning sector.

2.3. Impact on surface and groundwater

The composition of water effluents greatly varies between tanneries. Nevertheless, all untreated water effluents coming from tanneries might cause significant environmental impact.

Untreated wastewater discharged into close rivers or water canals eventually reaching the sea, will deteriorate rapidly the physical, chemical, and biological properties of the receiving water bodies. Untreated wastewater contains three main types of matter and chemicals that cause great damage:

- Suspended solids;
- Organic matter and;
- Chemicals and toxic residues.

First, suspended solids are mainly generated in the effluents of the liming process. Suspended solids such as lime or insoluble salts will cause turbidity on the water and by settlement damage on the bottom of the

receiving water body destroying habitats, microorganisms and other living life.

Second, organic matter decomposes in the water at a high pace depleting the dissolved oxygen necessary for this process and also causing noxious odors. Due to the fact oxygen is vital for aquatic life, dissolved oxygen would highly affect water biodiversity.

Third, chemicals and toxic residues might vary depending on the final product and chosen processes but chemical such as sodium sulphide, calcium hydroxide, acids, carbonates, sulphites, sulphates, chromium, ammonia, solvents, etc. are usually generated in the tanning processes. The discharge of these chemicals makes the water unsafe for any domestic usage or recreational activity.

Groundwater is another important source of water supply. When wastewater from ponds, pipes, drains or direct discharge on land and chemicals from inadequate storage and spills,

2.4. Impact on land

Inadequate environmental management at tanneries and especially on the management of wastewater, chemicals and hazardous waste can importantly damage the underlying soil. This soil impact can occur on pits and ponds, storage areas of chemicals and hazardous waste, waste dump areas, etc.

Discharging untreated or highly polluted wastewater, chemicals or hazardous waste on land might greatly disrupt any future use of the land such as for agriculture, recreation or urbanization. Contaminated soil might be unsuitable for agriculture production, recreation purposes and urbanization for a long period of time unless expensive decontamination measures are taken.

In regards to chemicals and hazardous waste, poor storage and management might cause great impact on land. If chemicals or hazardous wastes are dumped on land, this will cause damage on soil and eventually on groundwater as pollutants will slowly

different gaseous emissions such as:

- Odors;
- Hydrogen sulphide, ammonia and sulphur dioxide;
- Volatile Organic Compounds (VOCs);
- Dusts and other particulates; and
- Gases coming from energy source.

Odors. Odors might occur from decaying biological material of poorly managed waste, improperly stored and cured hides, poorly maintained waste water treatment plant, beamhouse processes and some toxic substances such as hydrogen sulphide, ammonia, etc.

Hydrogen sulphide, ammonia and sulphur dioxide. Sulphide emissions are coming from dehairing and waste treatment while ammonia emissions come from un-hairing and de-liming liquors and the decomposition processes. Sulphur dioxide emission comes from post-tanning operations.

Volatile Organic Compounds (VOCs). VOCs coming from the consumption of organic solvents in the degreasing of sheepskins and finishing operations might be emitted on posing a workplace health problem. These emissions can be avoided if the applied technology and controls at the plant are efficient.

Dusts and other particulates. Leather dust and other particulates might arise from mechanical operations such as dry shaving, milling drums, buffing and staking and during the handling of powdery chemicals. Leather dust and other particulates are considered as a potential carcinogen for exposed workers.

Gases coming from energy source. These gases are usually emitted from boilers and energy generators, including typical air pollution contaminants such as CO, CO2, NOx, and SOx.

In order to protect the environment, workforce health and the surrounding area of the plant from odors and harmful emissions, special attention should be devoted at least to the emission values of ammonia, hydrogen sulphide, volatile organic compounds (VOCs), total particulate matter, carbon monoxide and nitrogen oxides.

2.6. Impact on waste management systems

By-products and waste generated during leather production might include trimmings from raw hides, lime fleshing, lime split and pelt trimmings, chromium shavings, chromium split, chromium leather trimmings, buffing dust, finishing chemicals, sludge from waste water treatment, packaging, salt, organic solvents, residues of process chemicals and auxiliaries, fats from