RESTORATION OF FLUVIAL ECOSYSTEMS

Course ATHENS, 15 – 18th March, 2010

E.T.S.I. Montes

Universidad Politécnica de Madrid, SPAIN

Impact assessments and habitat enhancement for fish communities. Angling and Sport Fisheries Management.

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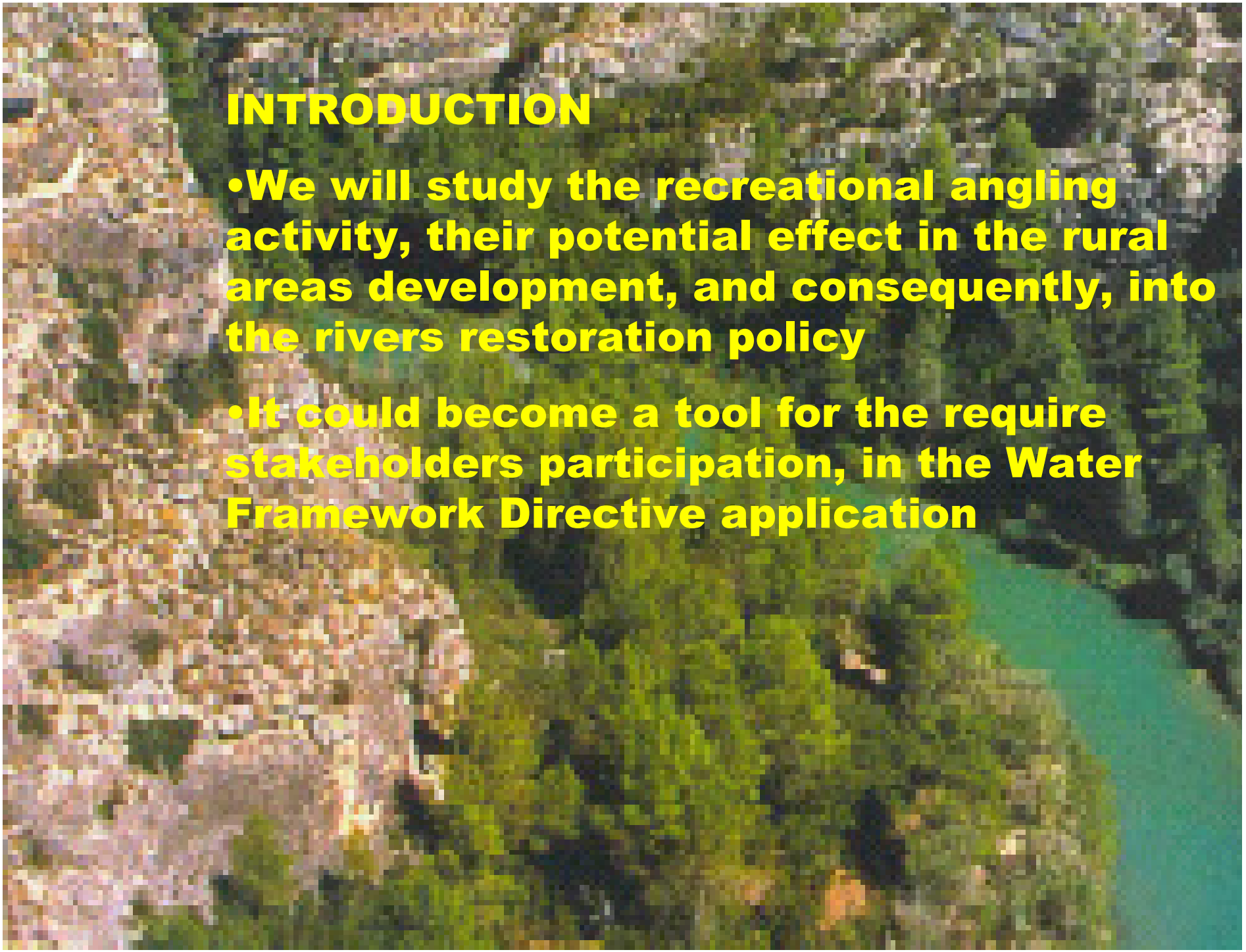
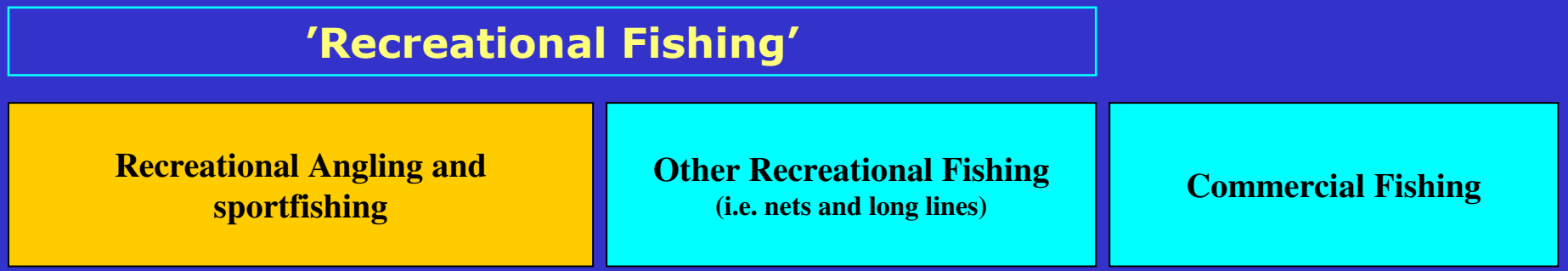
March, 2010

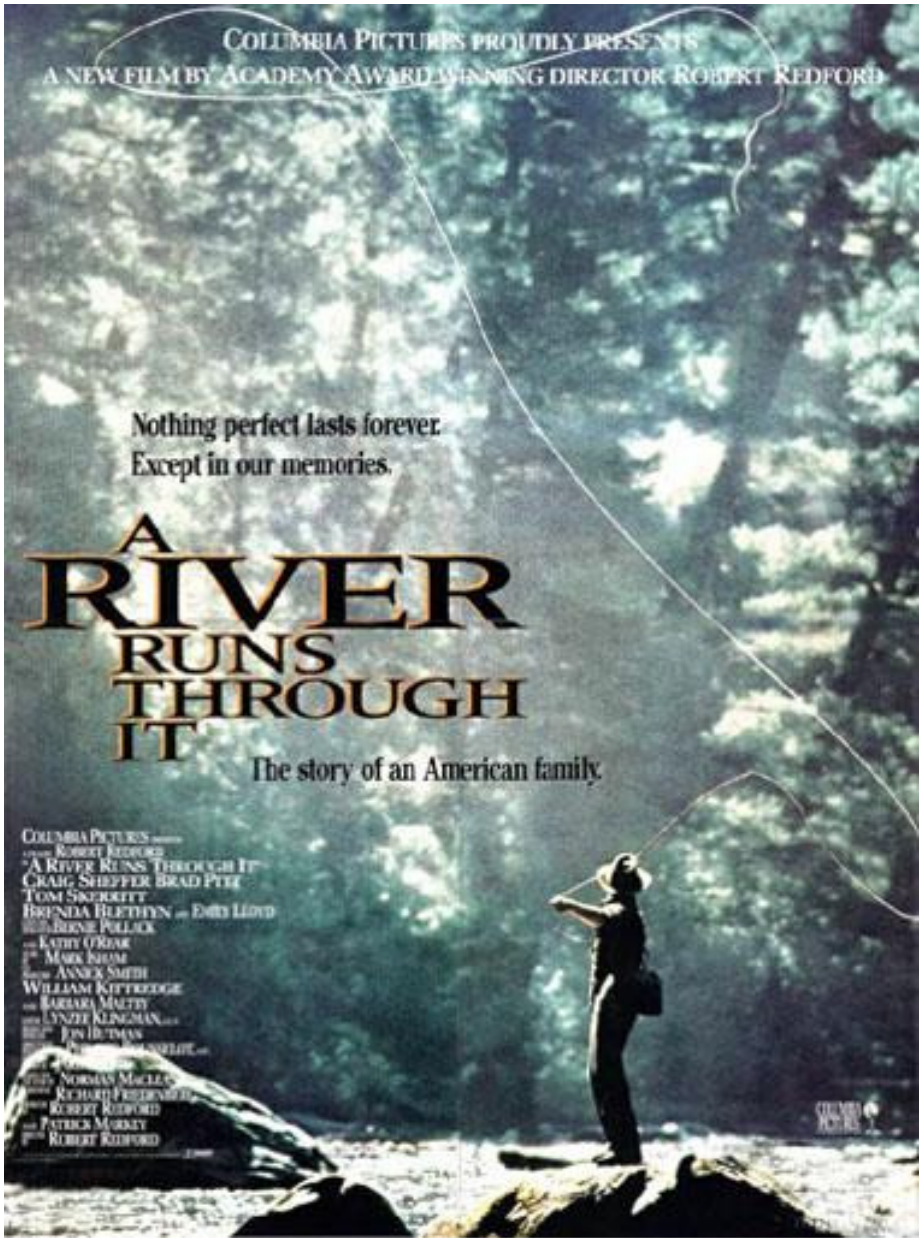

INTRODUCTION
•We will study the recreational angling activity, their potential effect in the rural areas development, and consequently, into the rivers restoration policy
•It could become a tool for the require stakeholders participation, in the Water Framework Directive application

Definition Recreational angling

- Rod and line
- Non-commercial
  - Anglers do not sell their catch
  - return or eat it within the family unit
- Recreational angling is part of the broader defined activity 'Recreational Fishing'
  - but far the biggest in value and practitioners



Recreational angling Worlwide Assessment



AMERICAN SPORTFISHING ASSOCIATION

SPORTFISHING in America

AN ECONOMIC ENGINE AND CONSERVATION POWERHOUSE

REVISED JANUARY 2008

USA, 2008 data

(American Sportfishing association .

http://www.asafishing.org/asa/images/statistics/resources/SIA_2008.pdf)

- More american fish than play golf and tennis combined

- Sportfishing provides 9 times the economic benefits of commercial fishing

Recreational anglers are at the forefront of aquatic conservation

Surveys indicate 95% of americans support legal recreational fishing

European Anglers Alliance (EAA)

www.eaa-europe.org

>5 million affiliated anglers

>25 million anglers in Europe

European Recreational Angling makes a huge economic contribution

* Europe: EU/25 + EFTA/4

- > 25 million anglers
- > 25 billion Euro

This important socio-economic value contributes first and foremost to the rural and most remote areas.

And still recreational angling has a substantial growth potential in all European Countries.

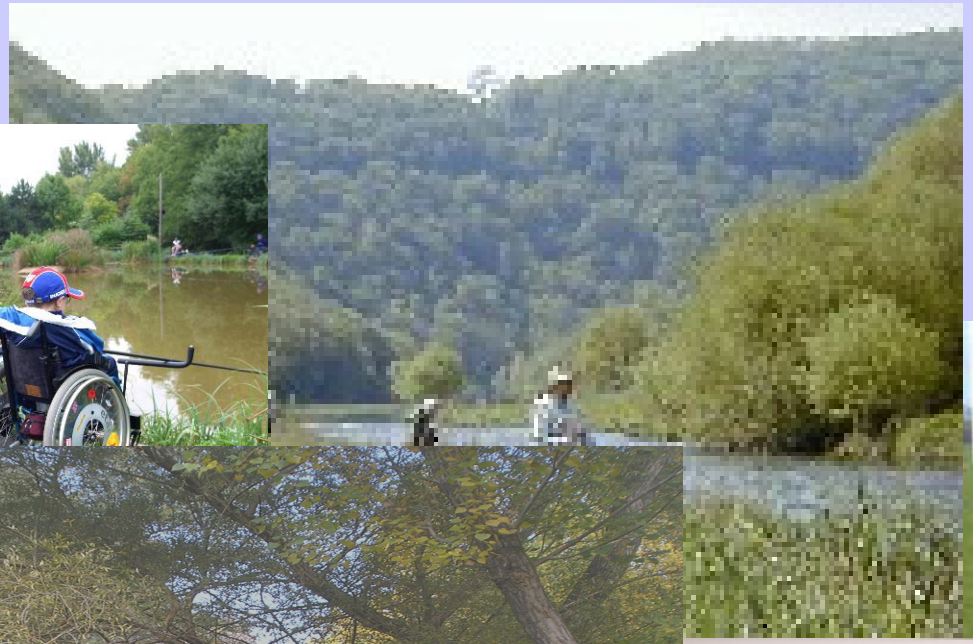
Anglers are environmentally friendly

- Anglers are society's 'eyes and ears' in the water habitats. First ones to alarm the authorities if something seems wrong.

- Anglers and their organisations care about the environment and biodiversity
- and have done so for more than a century; long before any environmental organisation was born.

- Anglers and their organisations possess unique data and knowledge about water habitats and fish.

They are everywhere...



...everyseason.

As an example:
Key EAA campaigns at present:

- ***Common Fisheries Policy*** – campaigning for radical reform based on the Commission policy of the ecosystem approach to fishery management and recognition of the value of recreational sea angling
- ***Water Framework Directive*** – encouraging stakeholder participation in the establishment of good ecological quality for surface waters – of vital importance to freshwater fisheries
- ***Cormorant management*** – working with partner organisations to establish a Europe-wide sustainable management plan for fish-eating birds
- ***Migrating species*** – influencing NASCO and IBSFC to maximise conservation of wild Atlantic and Baltic salmon populations, minimising the impacts of aquaculture and campaigning for measures to halt the decline of the European eel

Key questions and operative proposals

On 5th of December 2008, after comprehensive preparatory discussions, the European Parliament adopted a resolution which urges the EU Commission "to promote the sustainable management of cormorant populations .... and to create appropriate conditions for the drafting of a Europe-wide cormorant population management plan."
The resolution stated that, although primary responsibility in this field rests with Member States and their local authorities, it has already been demonstrated that purely local and/or national measures are not capable of reducing for any length of time the impact of cormorants on European fish stocks and fishing. A common, legally binding approach which is accepted and applied throughout Europe would therefore not only be desirable, but absolutely essential, and would also have the advantage of creating greater legal certainty for all interest groups concerned.
Bearing in mind the extraordinarily high mobility of the cormorant as a migratory bird, a coordinated action plan or management plan for the whole of Europe seems the only effective approach, and as such would be the most reasonable way to reach the aims of the Wild Birds Directive of 1979. Such a plan would, after all, naturally guarantee the central conservation aims of the Directive, particularly the 'good conservation status' of the species. The aim is not to regulate the cormorant population as an end in itself but to strike a balance between different but perfectly legitimate aims, in the interests of the sustainable use of fish stocks: bird conservation and maintenance of diverse bird and fish fauna on the one hand, and the legitimate interest of fishermen and fish farmers in the economic use of fish stocks on the other.
To this end, up-to-date, reliable data on the actual cormorant populations are also needed, as the figures available so far not only seriously contradict one another but are often based on different criteria (subspecies, different geographical demarcations, breeding populations, etc.).

The report that is to be put on the table must therefore particularly deal with the following issues:
1. Improvement of the scientific gathering of reliable data on cormorant populations, and how the collection of such data can be promoted.
2. If a management plan for cormorants is adopted, there should be found ways of promoting bilateral and multilateral scientific and administrative exchanges, both within the EU and with third countries.
3. The Commission should explain the disparate conclusions of REDCAFE and INTERCAFE on the one hand and the FRAP report on the other hand, with regard to the cormorant problem. What overall conclusions does the Commission draw from them?
4. The concept of 'serious damage' as used in the Wild Birds Directive should be specified more precisely or defined more clearly in the interests of uniform interpretation.
5. What are scientifically justified practical measures which - provided that they were coordinated at EU level – could lastingly reduce the number of cormorants?
6. Within what time frame could a European Cormorant Management Plan be adopted in practice?
7. Should a procedure be established for coordinating, monitoring and reviewing measures under such a management plan?
8. What can the EU legislature specifically do to reduce the adverse impact of cormorant populations on fishing and aquaculture? What legal instruments are available for this purpose?
9. Financial and infrastructure resources should be made available for these purposes. (see 5, 6, 7, 8 and 10)
10. What role or task could the Commission take on in this connection, and what funding would be necessary for this?
11. How can Member States be motivated to participate actively in such a management plan?

The final objective must be to arrive at a fair balance between cormorants, fish stocks and legitimate fishery interests.
EAA is sure that this can be achieved, when the EU Commission establishes an adequate forum, where all relevant stakeholders are adequately represented and can bring in their arguments, and where these arguments are discussed and evaluated on basis of scientifically sound and rational criteria. However, no satisfactory solution is possible if – as has happened in the past – the legitimate concerns and solidly founded arguments of the European angling community are simply neglected.

Fish that are too large to be eaten by cormorants, are sometimes severely wounded.

Many pike that are caught during research fisheries show tell tale wounds inflicted by cormorants.

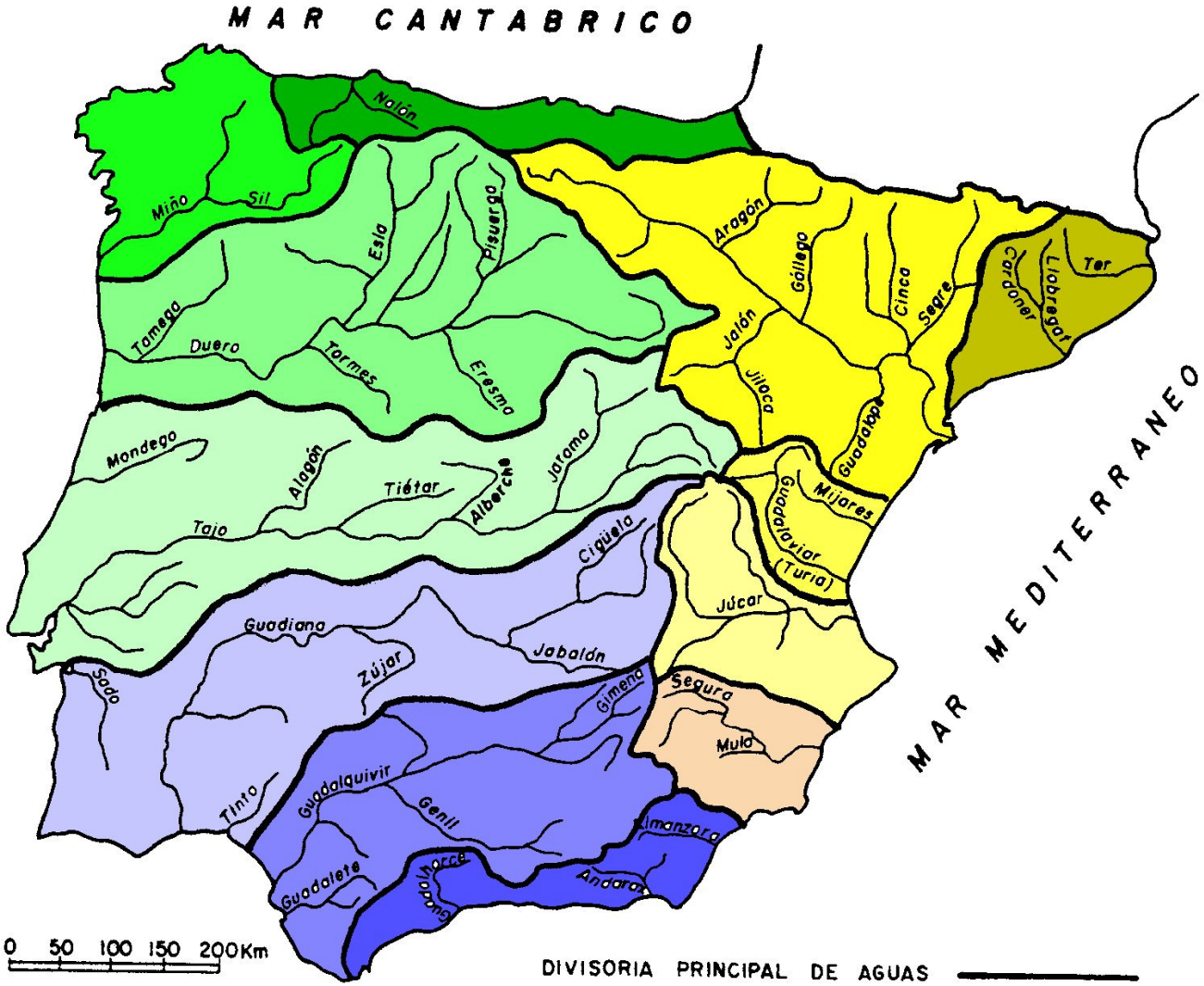
Wire mesh cages are placed to create artificial hiding places for fish.

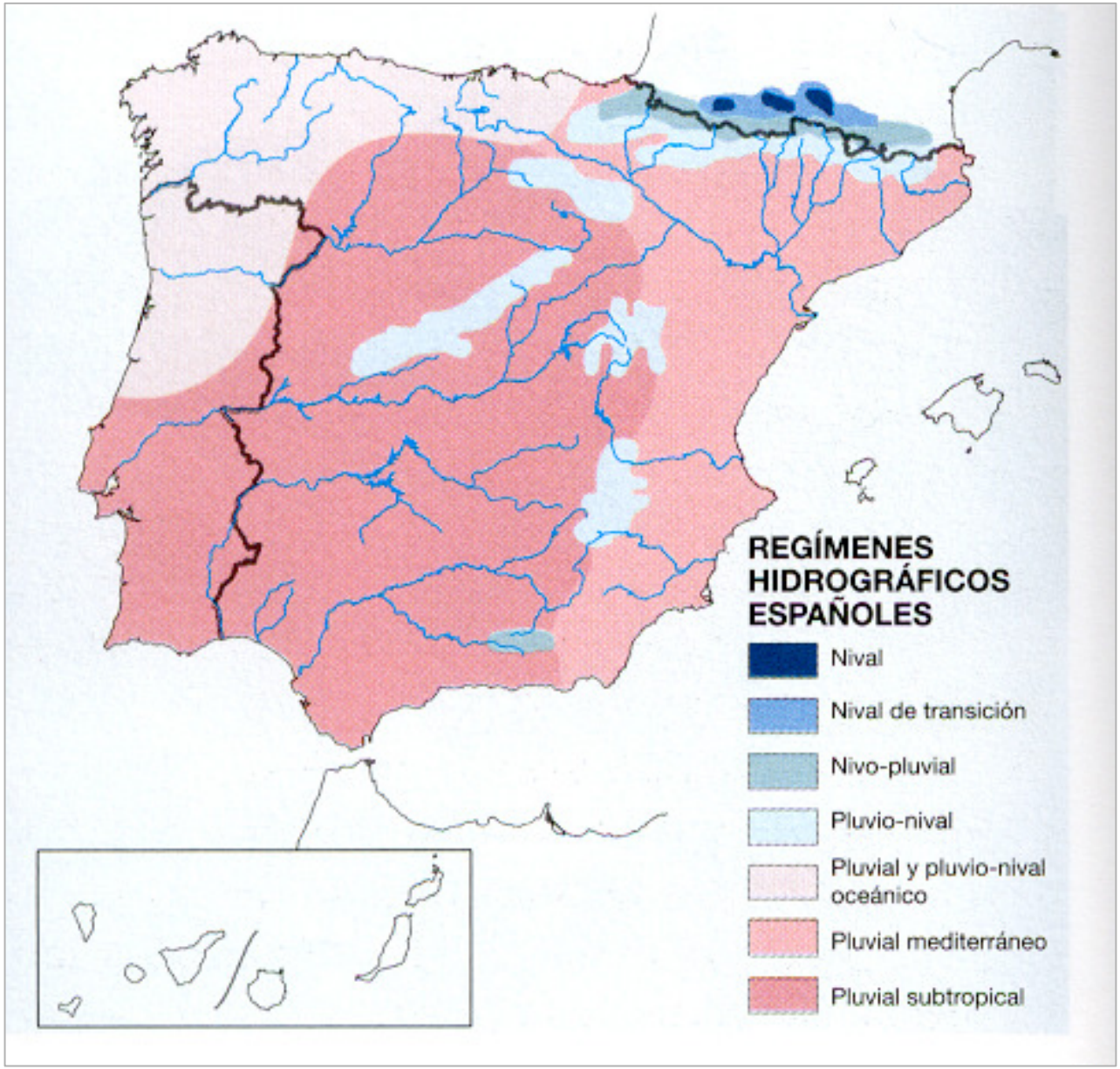
Even installations that produce the sounds of orca whales are used to scare away cormorants temporarily.

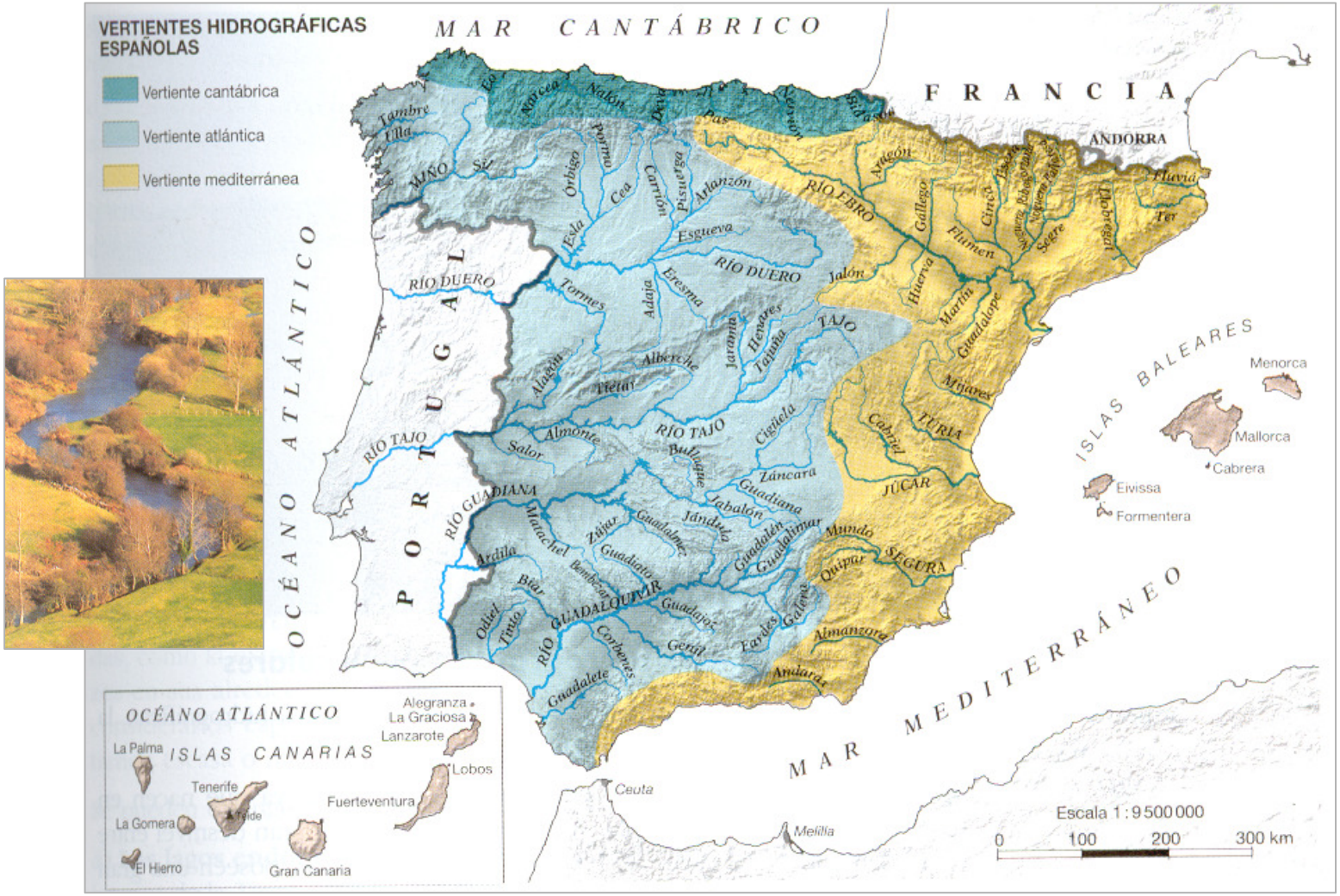
Cormorants

Problems and solutions


Recreational sportfishing management in SPAIN;
Standards and Procedures


MAR CANTABRICO
Nalón
Miño
Sil
Esla
Pisuerga
Tamega
Duero
Tormes
Eresma
Aragón
Gállego
Cinca
Segre
Jalón
Jiloca
Guadalop
Cardoner
Llobregat
Ter
Mondego
Alagón
Tiétar
Alberche
Jarama
Tajo
Cigüela
Guadiana
Zújar
Jabalón
Sado
Tinto
Guadalquivir
Genil
Guadalete
Guadiaro
Almanzora
Andarax
Segura
Mula
Júcar
Guadalaviar (Turia)
Mijares
MAR MEDITERRANEO
0 50 100 150 200Km
DIVISORIA PRINCIPAL DE AGUAS


REGÍMENES HIDROGRÁFICOS ESPAÑOLES
Nival
Nival de transición
Nivo-pluvial
Pluvio-nival
Pluvial y pluvio-nival oceánico
Pluvial mediterráneo
Pluvial subtropical

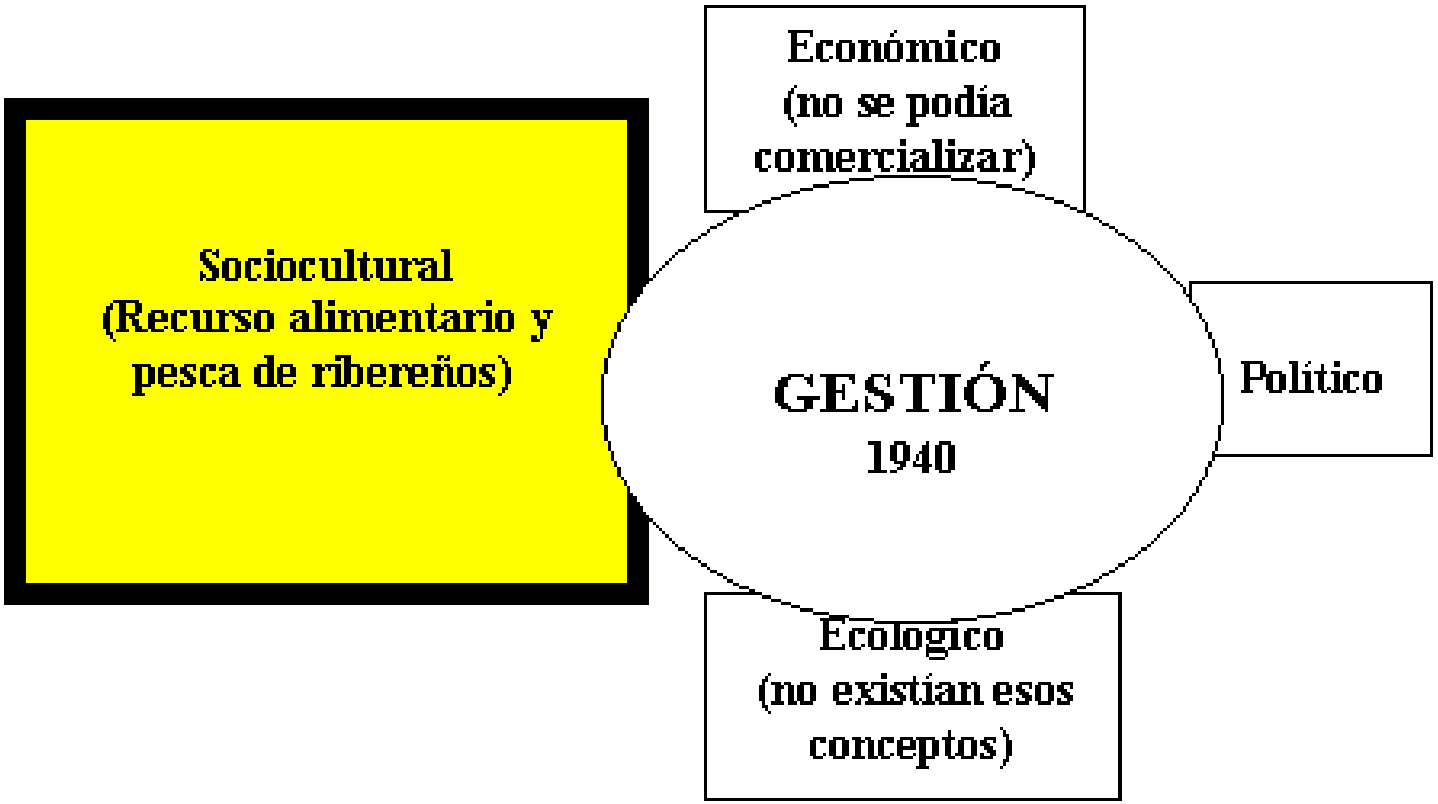

VERTIENTES HIDROGRÁFICAS ESPAÑOLAS
Vertiente cantábrica
Vertiente atlántica
Vertiente mediterránea
MAR CANTÁBRICO
FRANCIA
ANDORRA
PORTUGAL
OCÉANO ATLÁNTICO
MAR MEDITERRÁNEO
ISLAS BALEARES
Menorca
Mallorca
Cabrera
Eivissa
Formentera
Ceuta
Melilla
RÍO DUERO
RÍO TAJO
RÍO GUADIANA
RÍO GUADALQUIVIR
RÍO EBRO
JÚCAR
SEGURA
TÚRIA
Escala 1 : 9 500 000
0 100 200 300 km
OCÉANO ATLÁNTICO
ISLAS CANARIAS
Alegranza
La Graciosa
Lanzarote
Lobos
Fuerteventura
La Palma
Tenerife
Teide
La Gomera
El Hierro
Gran Canaria

In Spain all the rivers are public, and only in some regions private enterprises are allowed to manage portion of rivers or lakes

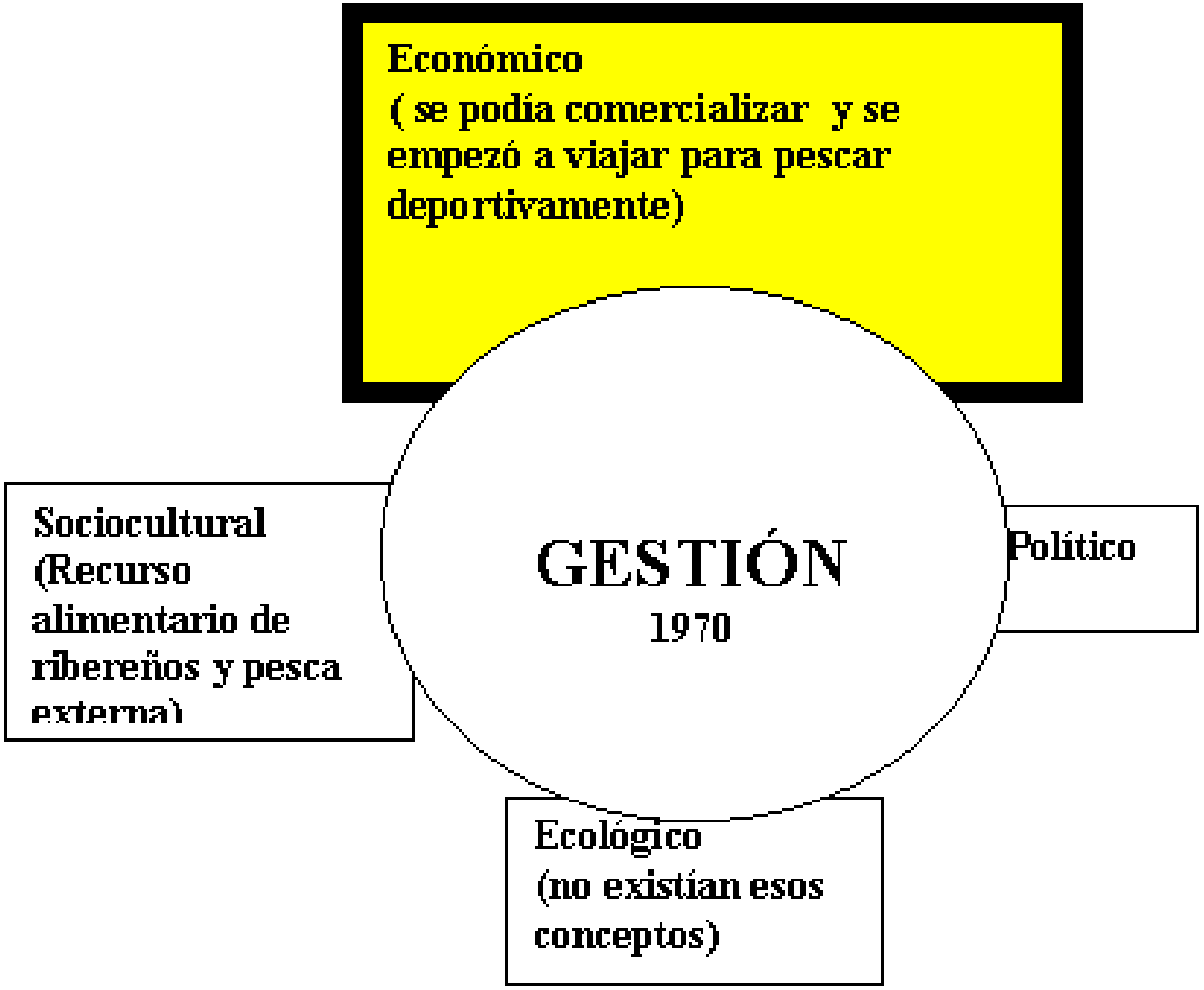
- We do have a regional management for fishing , contrary to the central management 20 years ago.
- We do manage rivers historically, in a river bassin basis as the WFD recommend, but not for very long for political reasons
- The existing recreational fishing managers are poorly trained, paralel to the decreasing activity importance
- Recreational Fishing historically is considered a very supportive activity in rural communities as it was a food resources in 1900 and, even now, a lot of grants are going to the activity (It is not treated as another sport (golf, etc.))

1. GESTIÓN DE LA PESCA EN ESPAÑA

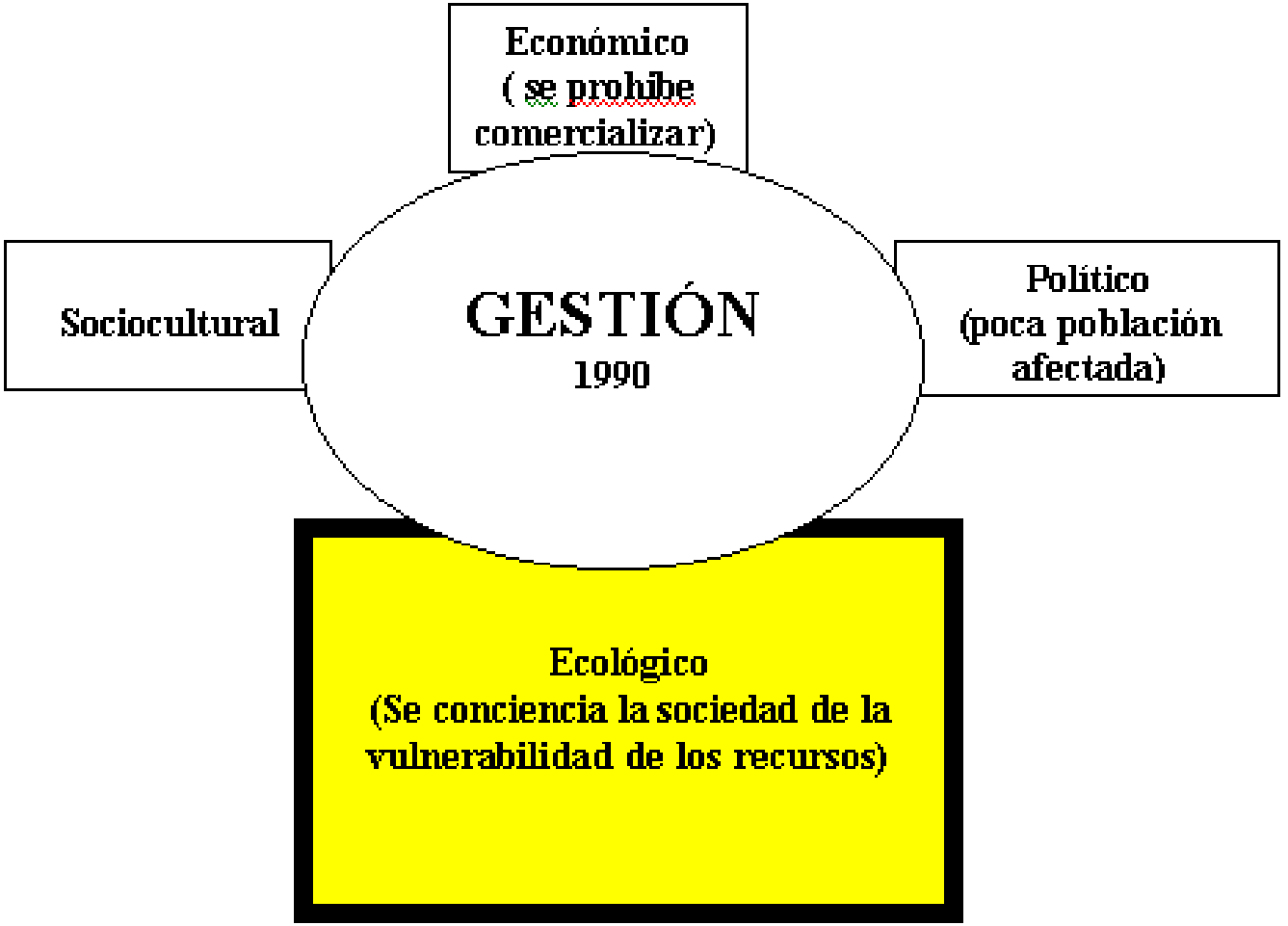
AÑOS 30



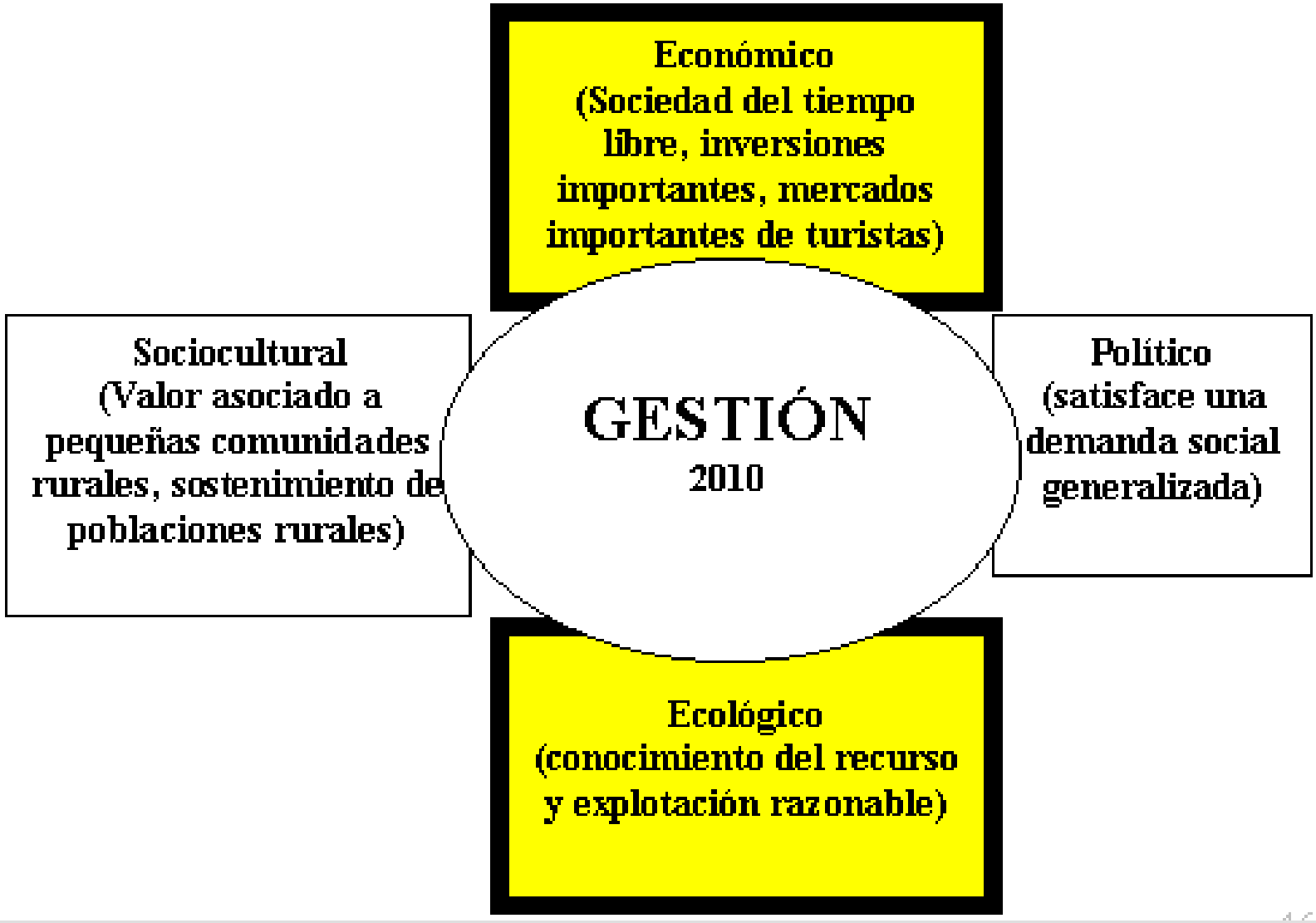
AÑOS 70


Económico
(se podía comercializar y se empezó a viajar para pescar deportivamente)
Sociocultural
(Recurso alimentario de ribereños y pesca externa)
GESTIÓN
1970
Político
Ecológico
(no existían esos conceptos)

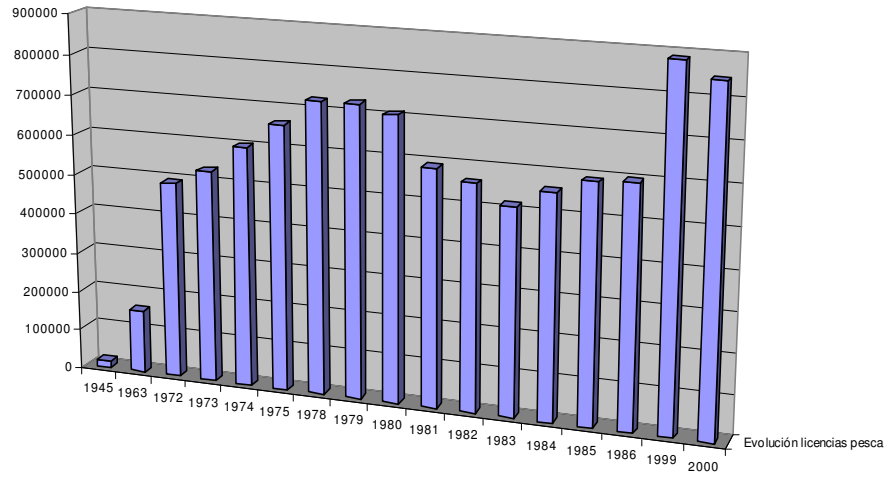
AÑOS 90


Económico
(se prohibe
comercializar)
Sociocultural
GESTIÓN
1990
Político
(poca población
afectada)
Ecológico
(Se conciencia la sociedad de la
vulnerabilidad de los recursos)

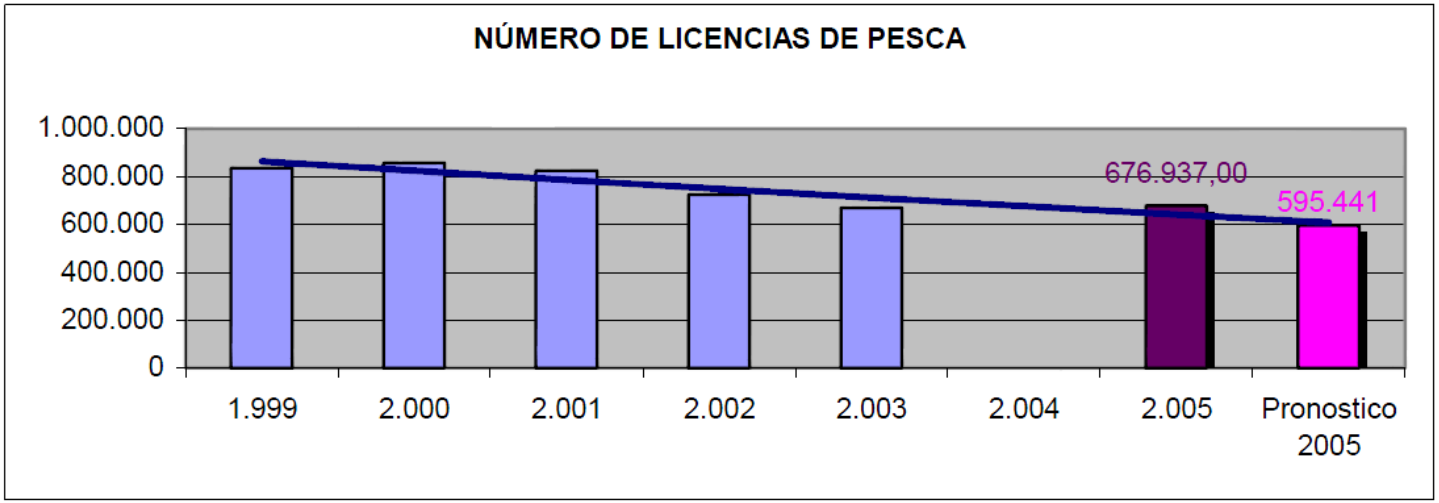
AÑOS 2010


Económico
(Sociedad del tiempo libre, inversiones importantes, mercados importantes de turistas)
Sociocultural
(Valor asociado a pequeñas comunidades rurales, sostenimiento de poblaciones rurales)
GESTIÓN
2010
Político
(satisface una demanda social generalizada)
Ecológico
(conocimiento del recurso y explotación razonable)

Spanish sportfishing licence evolution(freshwater)

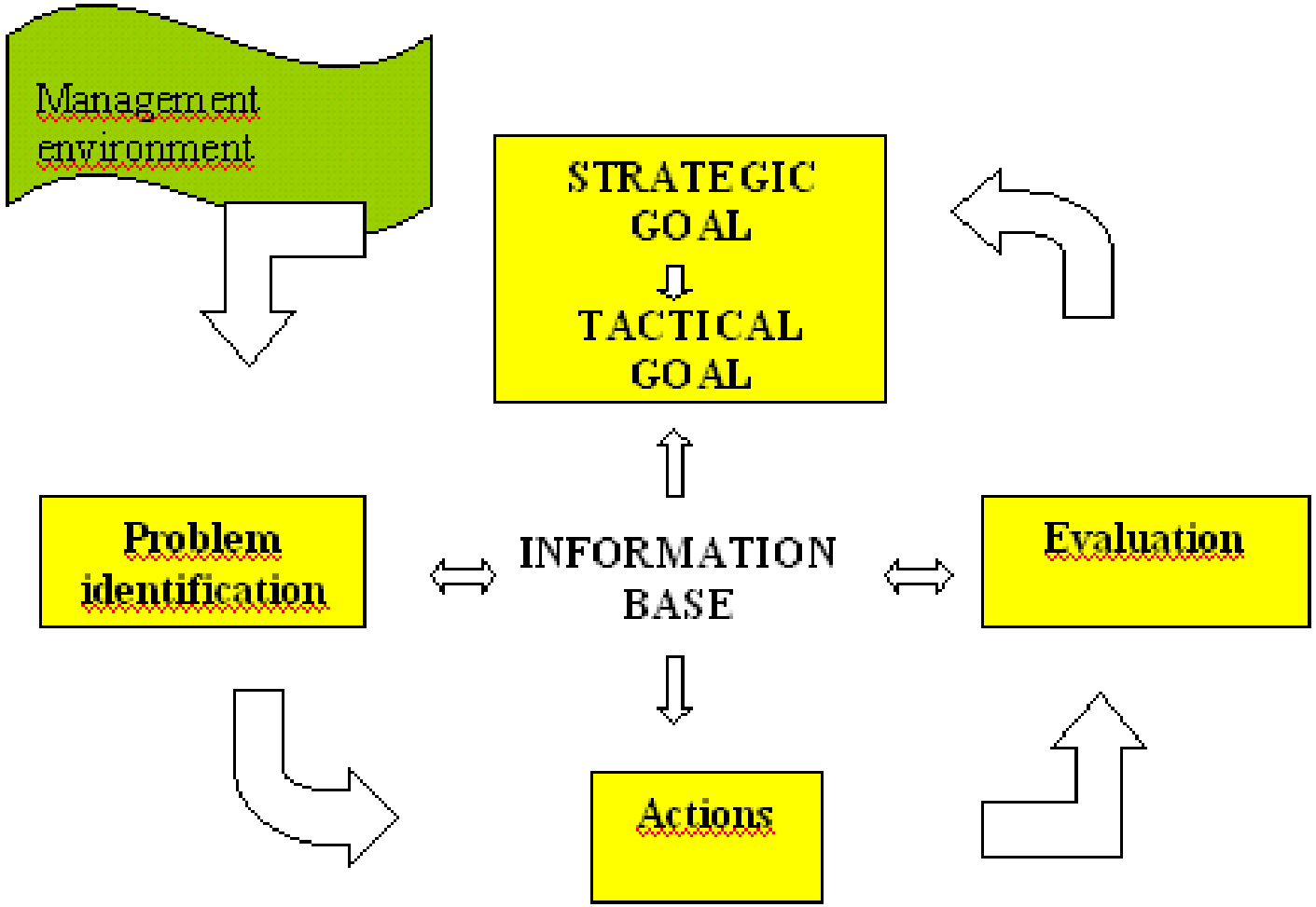


ANUARIO DE ESTADÍSTICA FORESTAL 2005




Sport Fishing Management & Planning;
Process for decission-making and communication to society

Steps of the fisheries management process



Communication: catalyst for effective fisheries management

Principles of Public relation (Decker & Krueger,1993)

- Every agency action makes an impression on its public
- Good public relations is a prerequisite to success en agency programs
- The public is actually many different groups of people
- Truth and honesty are essential to credible public relations
- Proactive is more effective than reactive
- Communication is the key to good public relations
- Planning comprehensive communication strategy is essential

Recreational sportfishing management, technical aspects

- 1.Rivers inventory
- 2.Rivers resources management plans

.2.1.Temporary technical plans

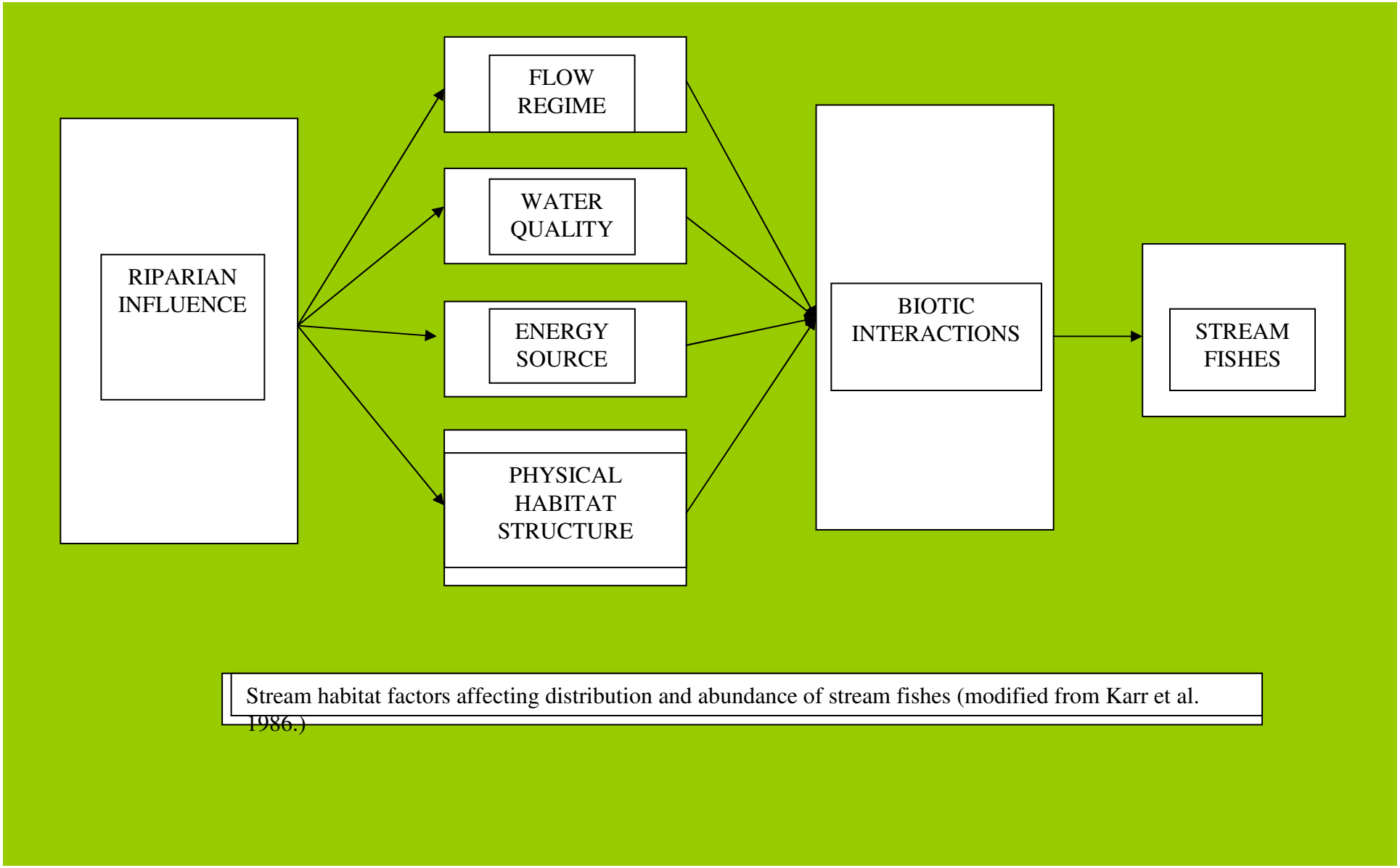
.2.2.Restocking

.2.3.Habitat enhancement

3.Monitoring and following up of Recreational Fishing Management

4.Vigilance

5.Predators



Stream habitat factors affecting distribution and abundance of stream fishes (modified from Karr et al. 1986.)

Recreational sportfishing management, technical aspects

- 1.Rivers inventory
- 2.Rivers resources management plans

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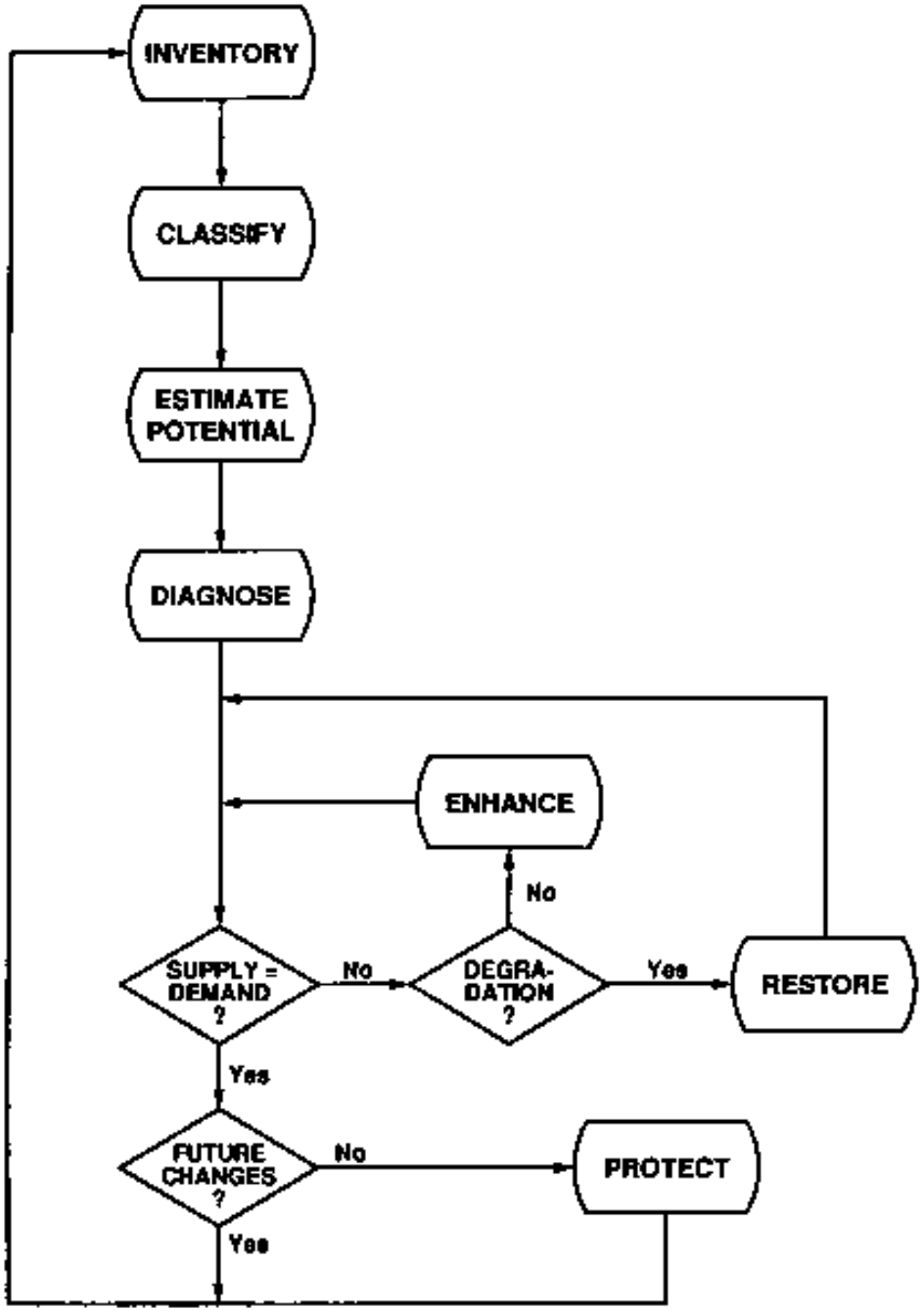


Figure 9.2 Stages involved in the process of stream habitat management.

Recreational sportfishing management technical aspects

- 1.Rivers inventory
- 2.Rivers resources management plans

.2.1.Temporary technical plans

.2.2.Restocking

.2.3.Habitat enhancement

3.Monitoring and following up of Recreational Fishing Management

4.Vigilance

5.Predators

- 2.2.Restocking

2.2.1. Measurable goals and simple results evaluation

2.2.2. Restocking ways

2.2.3. Techniques

2.2.4. Socioeconomic benefits of fisheries

2.2.1. Measurable goals and simple results evaluation

The tactical(short terms) goals should be quantified and easy to measured

Number of fish captured
Fishing hours
Captures by surface unit
Number of Fishermen trips
River lengths available for fishing
Data relating catches by fishing run
Nº of trophy fish catches...

2.2.2.Restocking alternatives

1. New species restocking

Refers to the introduction of new species (signal crayfish, catfish, etc). Records of past successes amount to a 48%

2. Populations reinforcement restocking

Carried out when the captures decrease

2.1 Maintenance. It is necessary when breeding totally fails (such as in rivers with dams that stop fish species migrating) Records of past successes amount to a 32%.

2.2 Supplementary. Such as when an age class is lacking. Records of past successes amount to a 5%.

2.2.3.Techniques

Management initial questions:

1.- Why restocking?

There are several reasons, following different procedures:

1. To introduce a new sportfishing species
2. To introduce fish as “feed” for another fishing species
3. To establish a biological control of a habitat
4. To start a recreational fishery of “Release-growth-and-catch”
5. To start a recreational fishery of “Catch-and-Release”
6. To supplement an age class
7. To solve a certain situation
8. To restock a native species extinct in an area
9. To create a “fish-trophy” Sportfishery
10. To increase the fishermen satisfaction
11. To redistribute the fishing effort in an area

2.2.3.Techniques(2)

2. **Which species?**
3. **What size?**
4. **How many?**
5. **When and where?**
6. **What quality?**

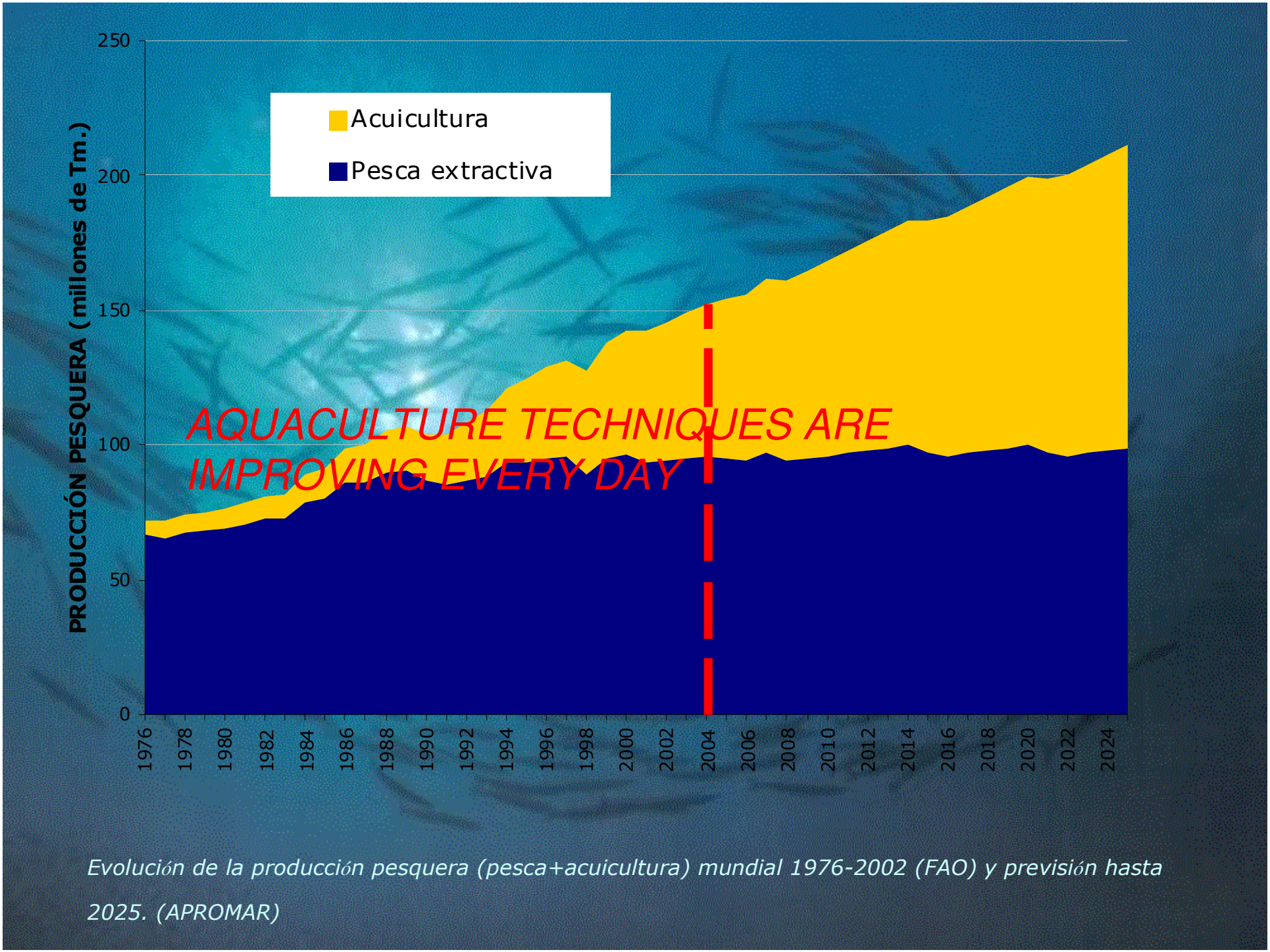
Aquaculture restocking techniques

1_ BACKGROUND IN SPAIN

2_ BASIC ASUMPTIONS IN LOCAL STRAINS OF BROWN TROUT

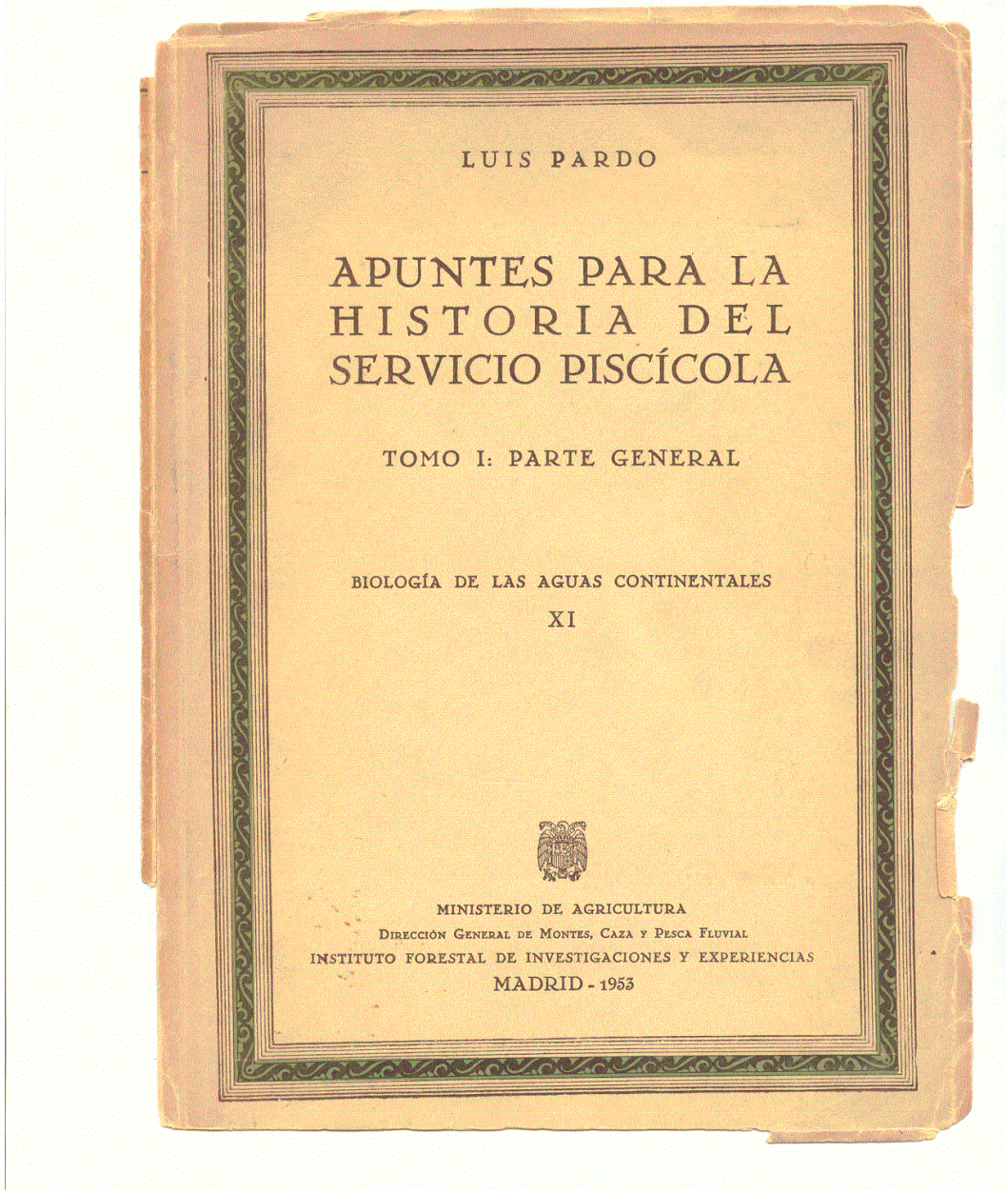
3_ QUALITY

4_ECONOMICS



Evolución de la producción pesquera (pesca+acuicultura) mundial 1976-2002 (FAO) y previsión hasta 2025. (APROMAR)

BACKGROUND IN SPAIN



LUIS PARDO

APUNTES PARA LA HISTORIA DEL SERVICIO PISCÍCOLA

TOMO I: PARTE GENERAL

BIOLOGÍA DE LAS AGUAS CONTINENTALES

XI

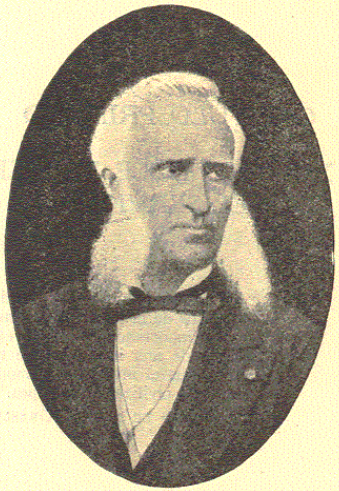
MINISTERIO DE AGRICULTURA

DIRECCIÓN GENERAL DE MONTES, CAZA Y PESCA FLUVIAL

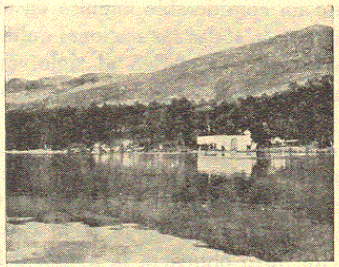
INSTITUTO FORESTAL DE INVESTIGACIONES Y EXPERIENCIAS

MADRID - 1953

o (3) la instauración de la Piscicultura, acariciándose ya la idea de ue constituyese una obligación estatal (fig. 3.ª).



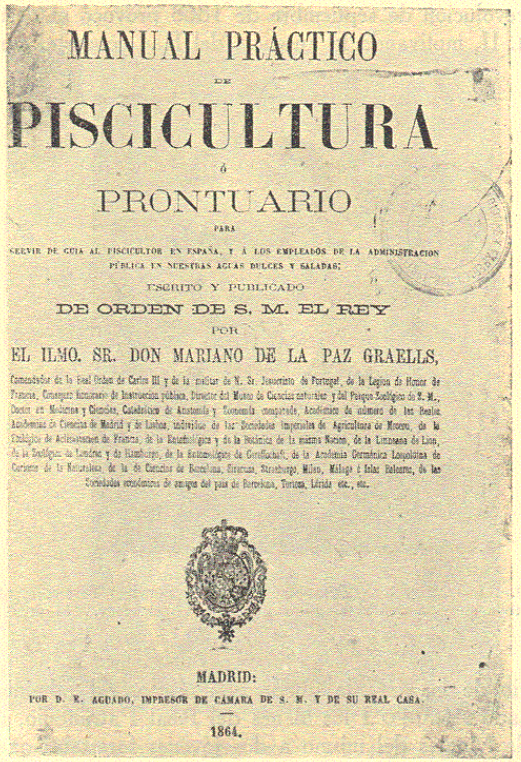
g. 1.ª — D. MARIANO DE LA PAZ GRAELLS Y AGÜERA, introductor de la Piscicultura en España, bajo los auspicios del Rey Francisco de Asís. (Arch. Rev. "Montes".)



g. 2.ª — El Laboratorio Ictiogénico de San Ildefenso, instalado por el Real Patrimonio junto al estanque El Mar, cuna que fué de la Piscicultura española. (Arch. Rev. "Montes".)

(3) En 1863, el Emperador de Austria, FRANCISCO JOSÉ, creó un laboratorio de icultura en uno de sus castillos; después, GUILLERMO III, de Holanda, estableció en Huisten Bosch, y la Reina VICTORIA, de Inglaterra, hizo lo propio en Windsor. estro FRANCISCO DE ASÍS siguió el ejemplo de aquellos ilustres monarcas.

Al mismo tiempo, la iniciativa privada establece la Piscifactoría del Monasterio de Piedra (Zaragoza), de la que trataré en el epígrafe 2 por haber sido la cuna de la Piscicultura estatal española, y durante lustros funciona particularmente merced al carácter emprendedor de sus fundadores.



MANUAL PRÁCTICO
DE
PISCICULTURA
Ó
PRONTUARIO
PARA
SERVIR DE GUIA AL PISCICULTOR EN ESPAÑA, Y Á LOS EMPLEADOS DE LA ADMINISTRACION PÚBLICA EN NUESTRAS AGUAS DULCES Y SALADAS;
ESCRITO Y PUBLICADO
DE ORDEN DE S. M. EL REY
POR
EL ILMO. SR. DON MARIANO DE LA PAZ GRAELLS,
Comendador de la Real Orden de Cárlos III y de la militar de N. Sr. Jesucristo de Portugal, de la Legion de Honor de Francia, Consejero honorario de Instruccion pública, Director del Museo de Ciencias naturales y del Parque Zoológico de S. M., Doctor en Medicina y Ciencias, Catedrático de Anatomía y Zoonomía comparada, Académico de número de las Reales Academias de Ciencias de Madrid y de Lisboa, individuo de las Sociedades imperiales de Agricultura de Moscou, de la Zoológica de Aclimatacion de Francia, de la Entomológica y de la Botánica de la misma Nacion, de la Linneana de Lima, de la Zoológica de Londres y de Hamburgo, de la Antropológica de Constantinopla, de la Academia Germánica Leopoldina de Curiosos de la Naturaleza, de la de Cárlos de Barcelona, Científicas, Strasburgo, Milan, Malaga é Islas Baleares, de las Sociedades económicas de amigos del pais de Barcelona, Tortosa, Lérida etc., etc.
MADRID:
POR D. R. AGUADO, IMPRESOR DE CÁMARA DE S. M. Y DE SU REAL CASA.
1864.

Fig. 3.ª — Portada de la obra de GRAELLS "para los empleados de la Administración Pública en nuestras aguas dulces y saladas". El libro se adelantó mucho a la existencia de los empleados, pero su anticipación hubiese sido más corta de no estallar la Revolución de Septiembre de 1868. (Arch. Rev. "Montes".)

Los trabajos de CARBONNIER en Francia, BUCKLAND en Ingla-

Restocking yes or no

The controversy that took place in the 1980's in the USA, where some people defended that the rivers should be left untouched and tried to reach the stage prior to human intervention and those who treated them as any other resource, has currently evolved, being the different positions much more close.

This is due to a higher level of knowledge, thus allowing a more sustainable management, with a planning adequate to the populations biology.

Aquaculture restocking techniques

1_ BACKGROUND IN SPAIN

2_ BASIC ASUMPTIONS IN LOCAL STRAINS OF BROWN TROUT

3_ QUALITY

4_ECONOMICS

Wild Atlantic salmon

a wondrous life cycle

Adult

Smolt

Parr

Fry

Spawning in a Redd

Eggs

Eyed eggs

Alevin

Visit **www.asf.ca**
to learn more

Paintings by Jud Ponnamon

Atlantic Salmon Federation
P.O. Box 5200, St. Andrews, NB E5B 3S8
P.O. Box 807, Calais, ME 04619-0807
(506) 529-4581
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CURRENT GOALS OF THE MAJORITY OF THE REGIONS IN SPAIN REFERRING RESTOCKING. BASICALLY CREATING SALMONIDS LOCAL STRAINS

- **Regional local strains trout broodstocks creation and maintenance, as a regional natural genetic resource**

Junta de Castilla La Mancha trout farm, Uña (CUENCA)

Trout farms belonging to the regional government JUNTA DE CASTILLA Y LEÓN


Vegas del Condado (León)

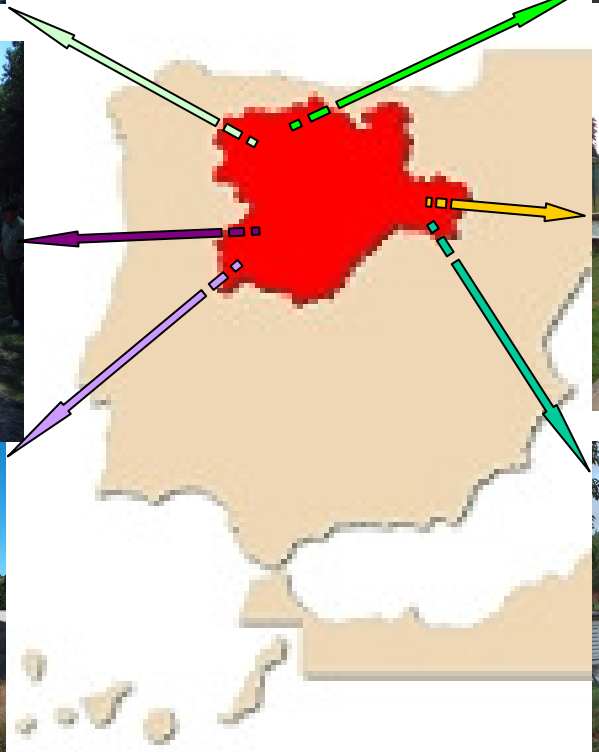

El Soto (Palencia)


Galisancho (Salamanca)


Quintanar de la Sierra (Burgos)


La Aliseda (Ávila)


El Molino de las Huelgas (Soria)



Brown trout (1+) central europe strain, versus a wild strain from Carrión river grown in our university

(ETSI de Montes)

Aquaculture restocking techniques

1_ BACKGROUND IN SPAIN

2_ BASIC ASUMPTIONS IN LOCAL STRAINS OF BROWN TROUT

3_ QUALITY

4_ECONOMICS

TROUT QUALITY USED ON RESTOCKING

CLASE DE EDAD(Age)

	Número
Huevos	
Recién eclosionados	
Alevines (<4 cm.)	
Jaramugos	
Truchas 0+	
Truchas 1+	
Truchas 2+	

ESTADO DE SALUD(Health status)

Vacunaciones

vacuna	enfermedad	método	fecha	temperatura	talla

Tratamientos

tratamiento	parásito	método	fecha	temperatura	talla

HISTORIAL Y CONDICIONES DE PRODUCCIÓN (Production background)

Vacunaciones	
Porcentaje de grasa	
Ultima clasificación	
Días de ayuno	

MORFOLOGÍA(morphology)

CARACTERES EXTERNOS			
Color			
	baja		
Pérdida de escamas	media		
	alta		
	Completas		
Deformación de aletas	**pectorales**	erosionadas	
		ausentes	
		Completas	
	dorsales	erosionadas	
		ausentes	
FACTOR DE CONDICIÓN			
K= 100xpeso/ (longitud)^3 (Long: cm.; Peso: gr.)			

It would be possible to select fish by CHARACTER?

Anglers will be prepared to pay the extracost of having wild fish, as bulls for bullfight?

ENHANCEMENT WILDFISH AGENCY ACT

PRODUCTOS Y TRANSPORTE	**Especie**	**Nº ejemplares**			**Longitud media**	**Fecha**
		soltados	muertos	total		
	Línea genética Procedencia					
	Temperatura del agua	En piscifactoría		En lugar de suelta	Tiempo de aclimatación a destino	
	Medio de transporte (con oxígeno, aireación…)					
	Nombre del encargado del transporte					
	Km. recorridos			Tiempo invertido		
DATOS DE LA REPOBLACIÓN	Río __ Arroyo __ Lago __ Embalse __ Laguna __ Nombre:			Provincia:		
	Términos municipales afectados:			Nº kms de río en que se ha realizado la suelta:		
	Nombre de los lugares afectados por la suelta:			Tiempo invertido en la suelta:		
	Funcionario responsable de la repoblación: D.			Cargo:		

	NOMBRES	**CARGOS**	**FIRMAS**
PRESENCIA RON LA SUELTA			

Rainbow trout; 143 strains (1986)

Brown trout ; 44 local strains (1986)

Aquaculture restocking techniques

1_ BACKGROUND IN SPAIN

2_ BASIC ASUMPTIONS IN LOCAL STRAINS OF BROWN TROUT

3_ QUALITY

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U.S. Fish & Wildlife Service

Chattahoochee Forest National Fish Hatchery

Science and efficiency at work for you

Economic Effects of Rainbow Trout Production 2005

Rainbow trout stocked:
1,004,836

Angler days generated:
348,901

Total economic output:
$25,572,853

A Tremendous Economic Impact

As part of the Service's National Fish Hatchery System (NFHS), Chattahoochee Forest National Fish Hatchery continues to use sound science to efficiently produce quality rainbow trout for fishing in modified habitats, contributing to healthy economies. Chattahoochee Forest NFH enhances recreational fishing opportunities, providing an enormous boost to the economy. The high quality and efficient rainbow trout production at Chattahoochee Forest NFH is just one aspect of their fish production that creates a positive ripple effect for all Americans.

photo: USFWS

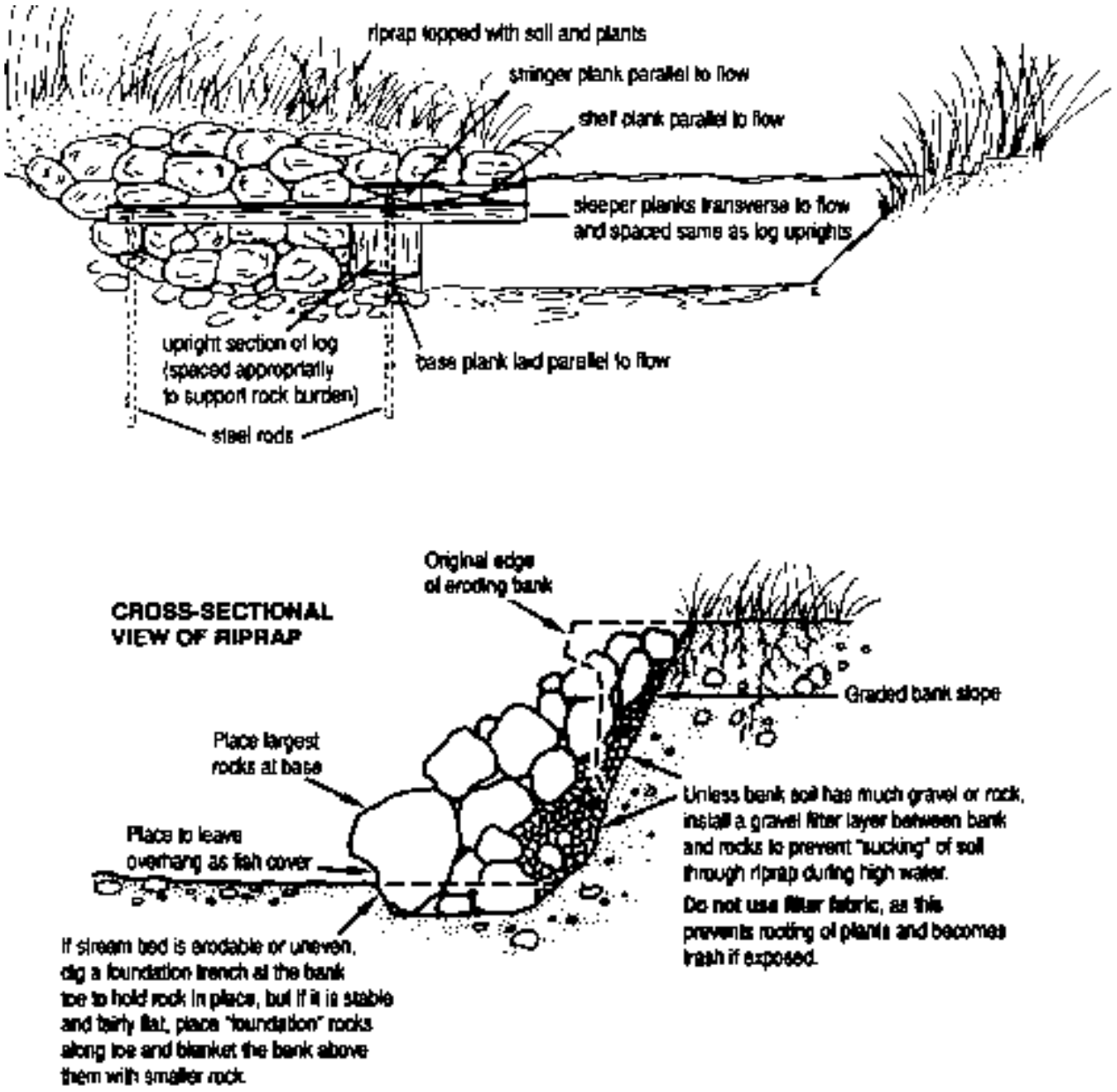
gas, lodging, rods and reels, and bait and tackle amounted to more than $12.7 million. That spending provided employment for 239 people, with more than $6 million in wage and salary income. Local, State and Federal coffers receive more than $1.8 million annually from taxes generated by the work at Chattahoochee Forest NFH. And for

Economical evaluation of restocking policies

1. Management cost /fishing days created
2. Fish production cost
3. Government restocking cost/ fishing days originated, multiplied by daily fishing cost
4. Restocking cost/Benefits to the anglers, and all the benefits associated, to local and state agents

Recreational sportfishing management technical aspects

- 1.Rivers inventory
- 2.Rivers resources management plans
  - .2.1.Temporary technical plans
  - .2.2.Restocking
  - .2.3.Habitat enhancement
- 3.Monitoring and following up of Recreational Fishing Management
- 4.Vigilance
- 5.Predators



gure 9.8 Rock structures for streambank revetment: riprap (above) and a cantilevered dge to provide for fish along current-bearing banks.

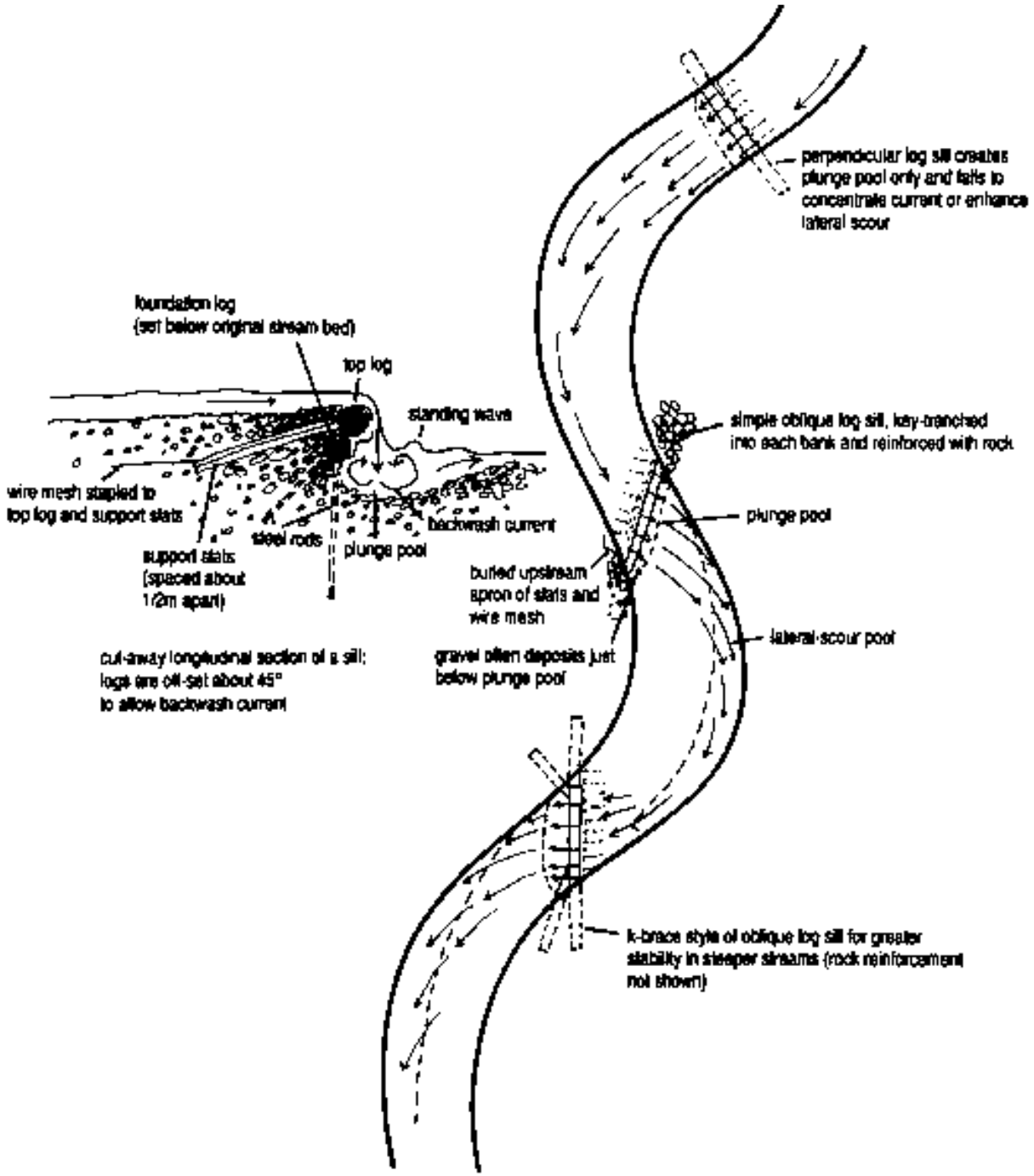


Figure 9.11 Oblique log sill design and placement.

Recreational sportfishing management technical aspects

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- 2.River resources management
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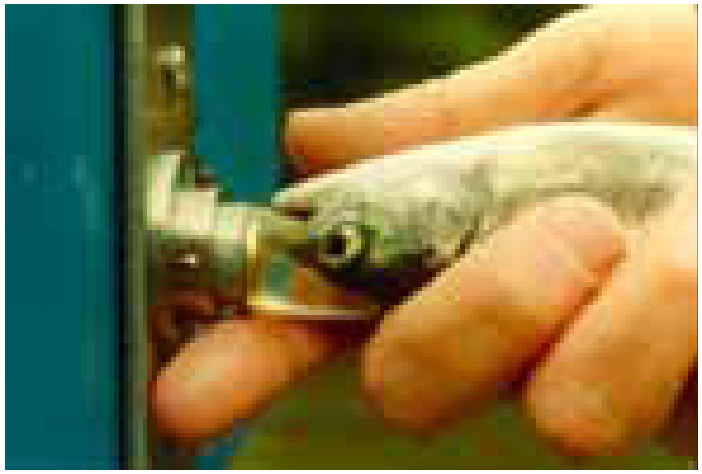
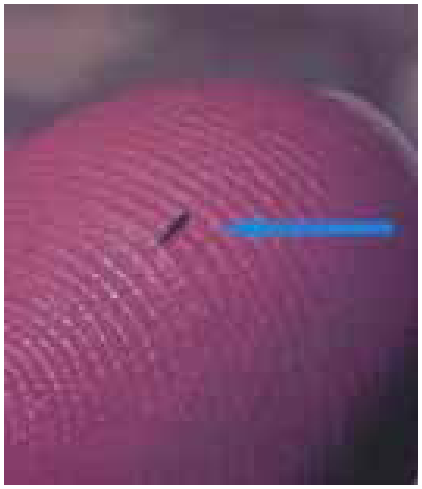
WM2





Recreational sportfishing management technical aspects

- 1Rivers inventory
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4.Vigilance

- *“It is needed to change the rural population view about fish value in the rivers. The value is out of the fishing tourism, not the fish, and their own responsability is to keep the fish and rivers in perfect condition”*

4.Predators

- *“It is needed to take into consideration the appearance of new predators as another serious ecosystem threat”*

CONCLUSSIONS

1. **The recreational sportfishing is a leisure activity and a tool to comunicate to the society the importance of river restoration.**
2. **The recreational sportfishing is a tool to monitor in a continuous basis the effectiveness of river restoration**
3. **An scientific approach to promote recreational angling will benefit the restoration of fluvial ecosystems**

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