### ÍNDICE

### **CHAPTER 1**

### PROTECTED AREAS. ARTIFICIAL INTELLIGENCE AND A NEW SCENARIO OF SOLUTIONS

Diego J. Vera Jurado

I. A general approach to the situation

II. Possible solutions for some shortcomings in protected areas. With special reference to the Autonomous Community of Andalusia

### PART I

### NATURAL AREAS, AI AND REGULATIONS

### **CHAPTER 2**

### SMART PROTECTED AREAS: CONCEPT AND AREAS OF ACTION

Juan Manuel Ayllón González

- I. Introduction
- II. The concept of a smart protected area
- III. Applying ICTs to gain better knowledge of the natural values of the protected area
- IV. ICT and tourism in protected areas
- V. The use of ICTs for monitoring and controlling protected areas
- VI. The use of ICTs in relief and rescue work
- VII. ICTs for the operational management of protected areas
- VIII. E-government in PAs
- IX. Safeguards for the use of ICT in PAs
- X. Conclusion
- References

#### **CHAPTER 3**

### SMART PROTECTED AREAS AS AN INSTRUMENT TO ACHIEVE SDGS. DEVELOPMENTS AT THE INTERNATIONAL, EUROPEAN AND NATIONAL LEVELS

Elsa Marina Álvarez González

- I. Introduction
- II. Smart PAs and SDGs
- III. At the international level

- 1. Actions implemented by the International Union for Conservation of Nature (IUCN)
- 2. Actions implemented by private initiative
- 3. Cross-border public-private cooperation actions
- 4. Other initiatives
- IV. At the European level
  - 1. Actions in the European Union: Green Europe
    - 1.1 European Green Deal
    - 1.2. European Climate Law
    - 1.3. EU Biodiversity Strategy for 2030
    - 1.4. EU Forest Strategy for 2030
  - 2. The role of new technologies
- V. On a national scale
  - 1. New technologies in national parks
  - 2. Specific actions in some autonomous communities
    - 2.1 Andalusia
    - 2.2 Castile-La Mancha
    - 2.3 Galicia
    - 2.4 Valencia

References

#### **CHAPTER 4**

### E-GOVERNMENT AND SMART PROTECTED AREAS

#### Juan Manuel Ayllón González

- I. Introduction
- II. The implementation of e-government in the management of PAs in Andalusia
  - 1. An electronic office for Andalusian environmental administration
  - 2. The right of citizens to interact with administrations using electronic means and electronic records in the Andalusian environmental administration
  - 3. Electronic notifications in Andalusian environmental administration
  - 4. The electronic processing of administrative procedures
  - 5. Citizen folders
- III. Transparency of the Andalusian environmental administration in PA management

1. General electronic access points of public administrations as vehicles for transparency, and transparency portals

2. The active right of access to environmental information in Andalusia

- 3. The active right to environmental information as applied to PAs in Andalusia
- 4. Strengthening environmental information in the National Parks Network
- 5. The incorporation of geographic information into the Land Registry
- IV. E-government initiatives to improve PA administration in Andalusia
- V. PA authorizations, automated administrative procedures and artificial intelligence
- VI. Regulatory reforms in the legal system of PAs in Andalusia to achieve better e-government

VII. Conclusion

References

### **CHAPTER 5**

# THE VALUE OF ICTS TO EFFECTIVELY COORDINATE THE PROTECTION OF NATURAL AREAS: MITIGATING THE DISCREPANCIES BETWEEN TERRITORIAL AND ENVIRONMENTAL PLANNING

#### Esther Rando Burgos

I. Introduction

II. Regulatory framework of reference. Focus on Andalucia

III. Protection as the shared objective of environmental and territorial planning

- 1. Protected Area Planning in Andalusia
- 2. Environmental protection as a territorial planning objective
  - A. European frame of reference
  - B. Protection through territorial planning in Andalusia

IV. An overview of the situation regarding natural resources planning and territorial planning in Andalusia

- 1. Environmental planning in Andalusia
- 2. Territorial planning in Andalusia
  - A. The Territorial Heritage System of the POTA
  - B. Territorial protection in Sub-regional Territorial Management Plans

V. Shortcomings in the coordination between areas protected by environmental planning and territorial planning, and the usefulness of ICTs

VI. Conclusion

References

### **CHAPTER 6**

## CITIZEN PARTICIPATION IN SMART PROTECTED AREAS. THE CURRENT SITUATION AND SOME PROPOSALS

### Manuel Moreno Linde

- I. Introduction
- II. Governance, citizen participation and new technologies
- III. Citizen participation in smart protected areas
- IV. Functional and organic participation in protected areas
  - 1. Functional participation: public hearing and information procedures
  - 2. Participatory bodies: a critical view
- V. New participation tools
  - 1. Participatory processes regulated in the new laws on citizen participation
  - 2. Innovative resources for smart citizen participation

VI. Conclusion

References

Other resources

### **CHAPTER 7**

### TOWARDS SMART, CREATIVE TOURISM IN PROTECTED AREAS: FROM DESTRUCTION TO PROTECTION

#### María Remedios Zamora Roselló

I. Introduction

II. Visitors to smart PAs: in search of nature

III. Tourism's technological footprint: the environmental impact, data and digital disconnection

- 3.1. The environmental impact of technology on protected areas
- 3.2. The data footprint
- 3.3. Digital disconnection in a smart PA

IV. Regional planning framework: the General Plan for the Sustainable Tourism of Andalusia – Meta 2027

- V. Sustainable tourist destinations
- VI. Smart tourist destinations: adapting the model to PAs

6.1 Smart natural areas in the Valencian Community

VII. Conclusion

References

### **CHAPTER 8**

### SMART PROTECTED AREAS: DEVELOPMENTS AND PROSPECTS IN THE FRAMEWORK OF ENVIRONMENTAL TAXATION

Yolanda García Calvente

- 1. Introduction. Environmental taxation as an instrument to develop protected areas
- I. Smart protected areas as an object of environmental taxation

1.1 On the existence of an adequate conceptual definition of the concept of protected areas and smart protected areas

1.2 On the existence of an adequate legal framework

- II. The harm and benefits of a PA tax incentive in light of the equality principle
- III. Concrete measures to encourage smart PAs through state revenue and public expenditure
- **IV.** Conclusion

### PART II

### AI AND BIG DATA TECHNOLOGIES APPLIED TO PROTECTED AREAS

### CHAPTER 9

## THE APPLICATION OF NOVEL TECHNOLOGIES FOR THE SUSTAINABILITY OF NATURAL PARKS

Ali Ahmad

María Vanessa Martos Nuñez

- I. Introduction
- II. Improved mental health
- III. Economic values
- IV. Applications of new technologies
  - 4.1 Remote Sensing (RS)
  - 4.2 Remotely Piloted Aircraft (RPA)
  - 4.3 Satellites
  - 4.4 Sensors
  - 4.5 Wireless sensor technologies
  - 4.6 Artificial Intelligence (AI)
  - 4.7 AI cloud applications
  - 4.8 Big Data Analysis
  - 4.9 Decision Support Systems (DSS)
  - 4.10 Internet of Things (IoT)

- 4.11 Cloud computing
- 4.12 Mobile computing
- 4.13 Robots
- 4.14 5G Technology
- V. Conclusion
- References

#### **CHAPTER 10**

### **ARTIFICIAL INTELLIGENCE FOR PROTECTED AREAS**

Francisco Chicano García

- I. Introduction
- II. Artificial intelligence techniques
  - 1. Expert system techniques
  - 2. Optimization techniques
    - A. Iterated Local Search (ILS)
    - B. Evolutionary Algorithm
  - 3. Regression techniques
    - A. Multiple linear regression
    - B. Random forests
  - 4. Classification techniques
    - A. K-nearest neighbors
    - B. Neural networks
    - C. Support vector machines
- III. Artificial intelligence initiatives for the environment
  - 1. The opportunities AI offers for the environment
  - 2. Initiatives applying AI to support the environment
- IV. Examples of AI to protect natural spaces
  - 1. Land surface protection
  - 2. Crop protection and improvement
  - 3. Prevention of natural disasters
  - 4. Monitoring and protecting biodiversity
  - 5. Monitoring and reducing pollution
- V. Conclusion

### References