

CENTER FOR INTERNATIONAL PROGRAMS & SUSTAINABILITY STUDIES

Course name: Conservation Biology and Endangered Marine Species

Course code: ENV 3160

Total Contact Hours: 60

Course description

This course is aimed to highlight the importance of conservation biology in managing endangered marine species by emphasizing recent conservation efforts of umbrella species such as sea turtles and sharks in the Pacific of Costa Rica. Marine ecosystems of the eastern tropical Pacific provide a baseline source for species of high commercial interest in satisfying humans demand for food worldwide. However, numerous marine species are threatened by unsustainable human activities, such as overfishing and habitat destruction. We will develop a critical understanding of conservation biology, by emphasizing the general concept of biodiversity and in current case studies that focus on scientific investigations to answer critical life history aspects, recovery programs, species management, community conservation actions and Marine Protected Areas (MPAs). The students will also be introduced to a wide range of practical activities by visiting field stations and natural laboratories in Costa Rica.

This is a theoretical-practical course and it seeks to clarify the following question:

How has Conservation Biology been applied to document marine biodiversity, investigate human impact, and develop practical approach to prevent the extinction of species?

To answer this question, the following **knowledge** will be studied:

- Fundamental concepts of Conservation Biology
- New Science of Conservation Biology
- The origin of Conservation Biology
- Biodiversity in the present and past
- International organization for Conservation of species
- Endangered marine species (EMS)
- Migration patterns and life cycles of EMS
- Anthropogenic impact in marine ecosystems

The course will promote the following skills:

- Ability to understand the fundamentals of conservation biology as a science.
- Ability to debate about the significance of the biodiversity in past and presents.
- Ability to identify the international organization for conservation and their interactions with the society.
- Ability to discuss about the endangered marine species and its biology and impacts that makes them vulnerable.
- Ability to identify human impacts that threaten marine biodiversity.

Among the **values** and **attitudes** that will be promoted among the students are the following:

- Excellence in performance evidence.
- Responsibility to achieve goals.

- Tolerance to work in group.
- Respect to nature and their ecosystem (organism, stakeholder, and local community)
- Negotiating knowing how to inspire trust and empathy

Competencies, criteria and evidence

The competencies for the Veritas University are reflective and integral actions that respond to the professional profile and to the problems of the context, with appropriateness and ethical commitment, integrating the knowledge of being, know-how and knowledge to know in an improvement perspective. Below are both the disciplinary and general competencies, linked to their criteria and evidence of performance for this course.

Types of competencies	Performance criteria (sub-competencies)	Performance evidences
Specific Analyses the applications of conservation biology and its approach to documenting biodiversity, human impact, and develop practical methods to avoid the extinction of endangered marine species.	1_Discuss the concept of conservation biology considering its history and definitions.	Oral presentations Essay Mind Maps
	2_Distinguish different ways that scientists manage and document biodiversity at national and international levels.	Oral presentations Essay
	3_ Analyze human impact on marine ecosystem considering the different stakeholders, their environmental conflict, and conservation actions.	Thematic discussion Video field trip report
	4_ Applies genetic tool to support the identification of illegally traded species, according to the national and international conservation strategies.	Laboratory practices Essay Final research presentation
Generals		
Integrates concepts, nomenclature and key elements from the course to be used in upcoming professional life.	Learning to learn.	Thematic discussion / Mind Maps
Develops the knowledge, skills and attitudes necessary to learn how to communicate orally and in writing in the different areas.	Communicate disciplinary thoughts in an oral and written manner.	Essay/ Oral presentations / Final research report
Integrates the knowledge, skills and attitudes necessary to learn the techniques of teamwork and leadership.	Teamwork and leadership.	Oral presentations / Final research report
Integrates the knowledge, skills and attitudes necessary to learn the interpersonal communication techniques.	Respect towards other handle and resolve conflicts. To negotiate knowing how to inspire trust and empathy. Critical and logical thinking	Thematic discussion / Final research report

Contents

Subject 1. What is Conservation Biology?

- The new science of Conservation Biology
- The origins of Conservation Biology
- Biodiversity in the past (extinction)
- Biodiversity (species diversity, genetic diversity and ecosystem diversity)

Subject 2. Endangered Marine Species and their Biology

- International Convention for Conservation of species
- Endangered Marine Species from Costa Rica
- Migration patterns and life cycles of Endangered Marine Species
- Threats

Subject 3. Tropical Conservation Marine Biology: cases of studies in Costa Rica

- Unravelling the ecology of Sea Turtles in the north Pacific
- Sea turtle's threats and conservation action
- Shark finning and international trade
- Building capacities to implement international regulations

Subject 4. Conservation Genetics

- Introduction to conservation genetics
- Application of genetic tools in Conservation

Methodology

This course promotes the interaction between the students and the teacher, in order to develop an active feedback between the two parties. The course will be composed of participatory activities through case studies where the objective is that the students can solve in an individual and group way a research question previously planned by the teacher. This in turn would allow students to learn and critical analysis in different working situations.

Audience

This course is structured for International Students attending the Study Abroad program at Universidad Veritas. However, courses are not exclusive to foreigners so a few native students could enroll in this course. Some of the courses are also taught in Spanish as part of our Bachelors in Sustainability Management.

Attendance

Students are only allowed a total of 2 non consecutive (back to back) absences. The student will fail the course if he/she has more than two absences. Students will have a 0 on any assignment evaluated in class (presentations, evaluations, field trips, etc.) if absent unless the student presents an official document no later than one week after the absence. If the student presents an authoritative report to excuse the absence, he/she must submit the missed assignment on that same day. An unjustified absence to a field trip will immediately mean losing all of the points assigned to the field trip. If an official document is presented for the field trip absence students will have to present a research assignment to obtain 50% of the points. The only exception to this rule is when two-course field sessions collide in programming. Students can then opt for doing a research assignment not to lose any points.

Three late arrivals to class (15 minutes later) are treated as one absence. If you tend to be late for class, you will lose 25% of your total grade.

Code of conduct

Professors have the right to expel a student from the classroom should he / she:

- 1) Is disruptive in the classroom.
- 2) Behave in a disrespectful way.
- 3) Is under the influence of alcohol or even smell like alcohol.
- 4) Is under the influence of any illegal drug.
- 5) Shows hygiene problems that may disturb other students.

Electronic devices

The use of cell phones, smart phones, or other mobile communication devices is disruptive, and is therefore prohibited during class. **Please turn all devices OFF and put them away when class begins.** Devices may be used ONLY when the professor assigns a specific activity and allows the use of devices for internet search or recording. Those who fail to comply with the rule must leave the classroom for the remainder of the class period.

Learning Strategies

The following learning strategies will be carried out:

- Oral presentation: By means of digital presentations (power-point) each group of students will explain the content pertaining to a research topic assigned in advance by the teacher. The students must present at the end of this presentation the bibliographic sources in APA format, Sixth Edition, with a minimum of 10 references and their respective connection link.
- Thematic discussions: the end of this activity is for students to make small progress on their current research project (successes and misrepresentations) in front of the rest of the class and discuss possible suggestions for improving their models.
- Mind maps: It will take advantage of the development of mental maps (systems mapping) through which students will be able to investigate, extract, summarize and expose the most important information regarding their research topic.
- Laboratory practices: Laboratory practices will be established and implemented where the student conducts several processes throughout the course: DNA extraction, PCR, and Electrophoresis chamber. In order for the student to develop skills related to the correct proceeding in a molecular biology laboratory (BIOMOL).
- Essay: Students, individually, may issue their own opinion by formally interpreting and evaluating a specific topic. The objective is that the student correlates his research and his own knowledge and can clearly argue a possible application in real life.
- Video Field trip report: The field trip will be assessed by means of a video report where audiovisual material (photographs and/or video) will be included, where each of the activities performed in the field trip.
- Final research presentation: At this point students will conduct a thorough investigation into the topic assigned at the beginning of the course. They will have to carry out the analysis of their own results, consult literature and if possible consult experts on their research topic. At the end of the course students will present the information collected and analyzed in scientific article format to the professor. At the same time students should prepare a summary for the rest of their classmates, as they will be reviewers of the students who would present their findings on the final filing date.

Educational resources

In order to guarantee good development of the course, therefore to guarantee learning, the following resources are available: an updated bibliographic database, multimedia equipment that students can use for their individual presentations; whiteboards and other school equipment for weekly sessions, and readings provided by the educator. All of these complement the suggested projects and provide the students with higher possibilities of knowledge own ship. Most of the lessons will take place in the classroom.

During independent work periods students will be able to attend the institution. A campus library, study rooms, and computer labs are available for the students' independent work time. Free Wi-Fi connection for students, educators, and staff is provided on campus, which gives students the possibility to work not only in the library or computer labs, but also around campus.

Learning evaluation

In order to make the course or program better competencies based evaluation compiles and evaluates evidence by taking into account feedback providing pre-established criteria. The course evaluation must be aligned with the competencies and the teaching methodology. There is a rubric for each evaluation resource. Even though the rubric grants a grade, it is also a quantitative and qualitative description of the students' performance. The rubrics include the core and discipline key competences.

Rubrics	Weight
Oral presentations: <ul style="list-style-type: none"> Two oral presentations 	20%
Video field trip report: <ul style="list-style-type: none"> One video field trip reports (North Pacific area) 	20%
Lab Log <ul style="list-style-type: none"> Three laboratory practices (DNA extraction, PCR, and electrophoresis) 	15%
Essay: <ul style="list-style-type: none"> Three essay need to be achieves in the following topics: concept and fundamentals of conservation biology, documenting biodiversity, and application of genetic tools. 	15%
Final research presentation: <ul style="list-style-type: none"> Topic assigned at the beginning of the course (includes summary and oral presentation) 	30%
TOTAL:	100%

Rubric to evaluate oral presentations

From digital presentations, from previously assigned topics, it is intended that students through teamwork formulate critical and logical ideas that can then be transmitted orally and encourage the rest of the audience (classmates) to issue different points of view.

For the purposes of this course, two oral presentations with a value of 10% for each one will be made, with a total value of 20%. These presentations will be assessed by the following heading:

Indicator	3	2	1	Observations
Contents to be assessed in the oral presentation				
There is a mastery of concepts and these are transmitted effectively.				
It uses clear and representative images of the concept that is intended to manifest.				
The student has good projection and posture when it comes to exposing his subject. It doesn't get hard to get to the wall and it doesn't put its hands inside the pockets.				
The student expresses ideas related to the images in a fluent and clear way, without having to read support material (tokens, notes or text of the slides).				
The presentation has a logical order that allows the understanding of the subject exposed to the class.				
The student clearly and critically issues his own opinions on the assigned topic.				
The conclusion is solid and leaves the viewer with an absolutely clear idea of the issue exposed by the issuer.				
The student responds satisfactorily to the questions of the teacher and classmates regarding the subject exposed.				
The sources of information are varied and multiple (minimum 10 bibliographical sources) and contribute to the development of the topic. The information collected is related to the topic, is relevant and updated.				
Formatting aspects for oral presentation				
Includes cover with basic information (name of the students, name of the university and title of the subject).				
The bibliographical sources are in APA format (in its last edition) at the end of the presentation.				
It presents order, good spelling and punctuation.				
Total:				

Rubric to evaluate the video field trip report

The idea in this case is that students have the opportunity to interact and observe some marine species, the medium in which these species are found and in turn their interaction with the local community in "El Jobo". Therefore, all the information and experience acquire during the fieldtrip will be translated into an audio-visual material (videos) where they will describe each of the activities performed, which they have learned, results, discussions, and their opinions.

One field trips represent the total value of 20% and evaluated by the following heading:

Indicator	3	2	1	Observations
Report content				
The report has a logical sense as the different activities in the field trip are presented.				
The introduction has information obtained from books and/or scientific journals that supports the information within this report.				
The methodologies applied in each field tour activity (previously explained by the professor) are detailed in the report in written form.				
The methodology is supported by means of audiovisual and/or photographic material obtained specifically during the field trip.				
Relevant observations and conclusions are included around the activities performed on the field trip.				
Format aspects				
The report includes cover with the basic data (name of the students, name of the university, title, dates, location of the tour, etc.).				
Organization of the report: the structure of the work includes introduction, description of activities, audiovisual material obtained (photographs and/or edited videos), bibliography and/or annexes.				
The bibliographical sources are in APA format in latest edition.				
Presents order, has good spelling and punctuation.				
It presents space between lines (1.5) and source (Arial_11) according to the format requested by the teacher.				
Total:				

Rubric to evaluate laboratory practices

Laboratory practices are learning and analysis activities in which the scientific method is applied. Each practice will have a specific objectives and methodology to follow, previously established. Three topics will be analyzed: DNA extraction, PCRs, Electrophoresis chamber to assess shark species identification. In order for the student to develop skills related to the correct proceeding in a molecular biology laboratory (BIOMOL). Each laboratory session will be assessed with a value of 5% based on the information acquires and evaluated on drawing, labeling, recognizing, and describing the different techniques and methods used. Drawings from the three lab practices must be delivered to the professor, together with the written lab report (by email) following scientific articles/reports structure, format, and APA style for references.

Instructions for the students regarding to the different sections of this reports are the following:

1. **Introduction:** this section provides the reader the general knowledge of the topic related to each laboratory practice, which include a summary of each section written in an understandable and logic way. Use scientific articles from recognized journal as a reference. It must be one page (1.5 spaced).
2. **Objectives:** lab objectives will be provided by the professor during the lab, include them in your reports. 1 general and 2-3 specific objectives. It must be 1 general and 2-3 specific objectives.
3. **Methodology:** this section describes how the activity in the lab was performed, detailing the materials used in the lab (for example: DNA extraction kit, pipettes, centrifuges, tissues samples, etc.), include a list and photos of the specimens where the tissues samples was extracted (use common and scientific names) presented in the lab.
4. **Results:** this section includes the observations learned during the lab session (quantification of the DNA extraction, PCR, electrophoresis gel, special personal observations, etc.).
5. **Discussion and conclusions:** this section is most important for the report. It means to compare and contrast the observations against the information provide in the literature, providing differences and similarities between the observations and the information researched about the results obtained. It is expected to read after class about the techniques and methodologies used in the practice in order to be able to provide logic conclusions about the procedures. The discussion must be written in prose and conclusion as a list. References use a APA style. Make sure to use only reliable scientific sources.

For the qualification of the reports, two very similar headings will be used; (1) The first will serve to evaluate the reports with laboratory activities that include the manipulation of specialized equipment (furnaces, centrifuges, thermocyclers, and electrophoresis chamber). In addition, this section includes other materials as: pipettes, Petri dishes, tweezers, scissors, reagents and plastics; (2) the second rubric will evaluate aspects related to laboratory work, in this case, analyses of the results for shark species identification.

The three (3) group laboratory practices have a total value of 15%, in the end will average the score obtained between all practices and then that will be the equivalent of 15%, for this will be used the following headings:

Indicator	3	2	1	Observations
The students are responsible and careful in the manipulation of the laboratory equipment, respect the established laboratory rules and show solidarity, fellowship and respect for other classmates and teachers.				
The report includes a heading with the name of the students and the following sections of the report are complete: introduction, objectives, methodology and materials, results, discussion and conclusions and bibliography (the latter as requested by the professor).				
The introduction provides a general idea of the contents of the report. Presents a general and minimum objective a specific. The methodology describes each activity performed during the session and the materials used.				
The results should be presented in prose or in a table. In both cases, the name of the species studied and the observations made during the session must be detailed.				
The discussion compares, contrasts and discusses the observed results and the information found in the literature.				
The conclusions are presented in a list and are directly related to the objectives and the discussion.				
The report is clean and organized, and shows good spelling and punctuation.				

Total:				
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Indicator	3	2	1	Observations
The students are responsible and careful in the manipulation of the laboratory equipment, respect the established laboratory rules and show solidarity, fellowship and respect for other classmates and teachers.				
The report includes a heading with the name of the students and the following sections of the report are complete: introduction, objectives, methodology and materials, results, discussion and conclusions and bibliography (the latter as requested by the professor).				
The introduction provides a general idea of the contents of the report. Presents a general and minimum objective a specific. The methodology describes each activity performed during the session and the materials used.				
A section is shown where the students explain, in prose, the observations made during the session. This section should include a description of the progress of the student group in that session.				
Students must create a folder in the computers with the necessary software for the session of the day, they must also make a "Screenshot" on the work corresponding to that day where the date and time of the class appear in the laboratory.				
The report is clean and organized, and shows good spelling and punctuation.				
Total:				

Rubric to evaluate an argumentative essay

Students, individually, may issue their own opinion by formally interpreting and evaluating a specific topic. The objective is that the student correlates his research and his own knowledge, and can clearly argue a possible application in real life. The essay is strictly individual and student authorship.

The topic to be assessed with the essay is " Application of genetic tools: identification of illegal shark fin trade". The value is 10% and is evaluated by the following heading:

Indicator	3	2	1	Observations
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Introduction: Includes purpose, general theme exhibition and clear objectives.				
The main idea names the essay theme and outlines the main points to be discussed.				
Coherent, serious and convincing personal contributions are presented on the subject of the essay. At least two original and applicable contributions to the subject are presented.				
The secondary arguments and ideas are presented in a logical order that makes the author's ideas easy and interesting to follow.				
The structure or the order of the words (syntax) in the sentences is logical. Use punctuation and pronouns correctly. Carefully select the words (does not use slang).				
All the ideas presented are related to the topic. Ideas are presented with clarity and objectivity. These are not repeated nor do they show gaps. It did not use copying and pasting.				
The conclusion is solid and leaves the reader with an absolutely clear idea of the author's position.				
It has no spelling errors, accentuation or verb conjugation.				
Meets the following requirements: cover, margin size, intelligible font, character size, paragraph spacing, title congruent with content, student and subject information, appointments are clear and accurate.				
The sources of information are varied and multiple (minimum 10 bibliographical sources) and contribute to the development of the topic. The information collected is related to the topic, is relevant and updated.				
Total:				

Rubric to evaluate the final research presentation

This work aims to confront the student to a scientific investigation, which implies introducing and familiarizing each person with the different activities that are carried out in an investigation in the real life. Constructive critique and cooperativism are also promoted. The research carried out by the student groups will be developed in phases throughout the course. By means of conservation biology applications and tools and their respective procedures, complemented with cases of studies and their subsequent interpretation of their results. All of this findings will be presented and explained to the rest of the class through a group oral presentation.

This group final research presentation has a total value of 40%, has three qualification rubrics which have a different evaluation percentage: **1)** the first rubric has a scale of 1 to 5 and has a percentage of 25% where the work will be assessed formal writing; **2)** the second part, with a scale of 1 to 3 with a percentage of 5%, the format of the written work will be assessed and an auto-qualification will be carried out with respect to performance throughout the research project; **3)** a third heading with a scale of 1 to 3 will evaluate an oral presentation related to the research project. Each one will be evaluated according to the indicator in each table in the following way:

Indicator	5	4	3	2	1	Observations
Project structure and content						
The project is presented by a document written in the scientific article format.						
It includes the summary (<i>abstract</i>) of all the parts of the research summarized, as established in a scientific article (development, results, discussion and conclusion/recommendations).						
The work contains an introduction (minimum 3-4 slides), methodology (between 2 and 3 slides). Contains results (minimum 2 slides), Discussion (minimum 3 slides), conclusions and recommendations (minimum 2 slides).						
The introduction is clear and coherent it has logical order, which truthfully explains the contents of the investigation. It has bibliographic citations.						
The methodology explains step by step, in logical order, the procedures that were carried out throughout the investigation. It has bibliographic citations within the text in APA format in its last edition.						
Relevant results are presented for the investigation. Includes discussion, conclusions and bibliographic citations in the text.						
In the discussion there is a logical comparison of the results obtained and the information found in literature. It manages to analyze and explain possible differences between the consulted bibliography and the results obtained, when necessary.						
The sources of information are varied and multiple (minimum 10 bibliographic sources) that contribute to the development of the topic. The information collected is related to the topic, is relevant and updated.						
Total:						

Indicator	3	2	1	Observations
Project Format				
It has the space between lines (1.5) and the font (Arial_11) according to the format requested by the teacher.				
The project includes cover with the basic data and an executive summary (digital) for classmates and teachers.				
The results section presents pictures, figures, or other resources to represent them consistently.				
The bibliographical sources are in APA format in their latest edition.				
It presents order, good spelling and punctuation.				
Self-assessment				
I was responsible for the advances (oral and/or written) requested by the teacher, as I developed my research project.				
I devoted the time and effort necessary since the beginning of the course for research development.				
I did a thorough search of scientific information to give real support to my research.				
In my laboratory work, from the DNA extraction process, DNA quantification, PCR, electrophoresis and sequencing chamber were elaborated with great care and passion.				
I really followed the indications and advice of my teacher in the different phases of my final research.				
Total:				

Indicator	3	2	1	Observations
Contents to be assessed in the oral presentation				
There is a mastery of concepts and these are transmitted effectively.				
It uses clear and representative images of the concept that is intended to manifest.				
The student has good projection and posture when it comes to exposing his subject. It				

doesn't get hard to get to the wall and it doesn't put its hands inside the pockets.				
The student expresses ideas related to the images in a fluent and clear way, without having to read support material (tokens, notes or text of the slides).				
The presentation has a logical order that allows the understanding of the subject exposed to the class.				
The student clearly and critically issues his own opinions on the assigned topic.				
The conclusion is solid and leaves the viewer with an absolutely clear idea of the issue exposed by the issuer.				
The student responds satisfactorily to the questions of the teacher and classmates regarding the subject exposed.				
The sources of information are varied and multiple (minimum 10 bibliographical sources) and contribute to the development of the topic. The information collected is related to the topic, is relevant and updated.				
Formatting aspects for oral presentation				
Includes cover with basic information (name of the students, name of the university and title of the subject).				
The bibliographical sources are in APA format (in its last edition) at the end of the presentation.				
It presents order, good spelling and punctuation.				
Total:				

Bibliography:

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Wyneken J, Lohmann KJ, Musick JA. (2013). *The biology of sea turtles. Volume II.* CRC Press. Boca Raton.

Schedule

Week	Sub-competencies	Contents	Teaching strategies
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1	Explain the concept of conservation biology according to its story and definitions.	<u>Subject 1. What is Conservation Biology?</u> -The new science of Conservation Biology	Thematic discussion
2		<u>Subject 1. What is Conservation Biology?</u> -The origins of Conservation Biology	Oral presentation #1
3		<u>Subject 1. What is Conservation Biology?</u> -Biodiversity in the past (extinction)	Essay Thematic discussion
4		<u>Subject 1. What is Conservation Biology?</u> -Biodiversity (species diversity, genetic diversity and ecosystem diversity)	Essay Thematic discussion
5	Analyzes the different ways that scientists and manager document biodiversity at national and international levels.	<u>Subject 2. Endangered Marine Species and their Biology</u> - International Convention for Conservation of species	Essay Thematic discussion
6		<u>Subject 2. Endangered Marine Species and their Biology</u> - Endangered Marine Species from Costa Rica	Oral presentation #1
7		<u>Subject 2. Endangered Marine Species and their Biology</u> - Migration patterns and life cycles of Endangered Marine Species	Essay Thematic discussion
8		<u>Subject 2. Endangered Marine Species and their Biology</u> - Threats	Thematic discussion
9	Analyze human impact marine ecosystem considering the different stakeholder and their environmental conflict and conservation actions.	<u>Subject 3. Tropical Conservation Marine Biology: cases of studies in Costa Rica</u> - Unravelling the ecology of Sea Turtles in the north Pacific	Mind maps Thematic discussion
10		<u>Subject 3. Tropical Conservation Marine Biology: cases of studies in Costa Rica</u> - Sea turtle's threats and conservation action	Thematic discussion
11		<u>Subject 3. Tropical Conservation Marine Biology: cases of studies in Costa Rica</u> - Shark finning and international trade	Mind maps Thematic discussion

12		<u>Subject 3. Tropical Conservation Marine Biology: cases of studies in Costa Rica</u> - Building capacities to implement international regulations	Thematic discussion
13	It applies the use of molecular markers as a tool for the management and conservation of marine species according to a research question.	<u>Subject 4. Conservation Genetics</u> -Introduction to conservation genetics	Thematic discussion Lab practices
14		<u>Subject 4. Conservation Genetics</u> -Application of genetic tools in Conservation	Thematic discussion Lab practices
15		<u>Subject 4. Conservation Genetics</u> -Application of genetic tools in Conservation	Lab practices

General observations

The student must comply with the provisions of the Veritas University student regimen regulation. To consult it you should go to the student self-management Portal at the following address: <http://autogestion.veritas.cr/> and download it.