

RESEARCH QUESTIONS FROM THE SNAPP – SOUTH AMERICAN CAMELIDS PROJECT

DEFINITION OF THE MAIN AND SECONDARY QUESTIONS



This document contains the definition of the main and secondary questions that will be addressed in the SNAPP project: Addressing the impacts of sarcoptic mange in wild South American Camelids across a landscape of myths and legends, including the proposal of indicators, factors of variation and comparators that should be taken into account during the review of the three sources of information considered: published information, unpublished information and evaluation of perceptions.



Objective:

The aim of this research is to obtain evidence to understand the severity and impact of mange on South American camelid populations (SAC), as well as the effectiveness of veterinary treatments, and to identify if there are environmental and management factors of these species that could be related to the onset and prevalence of the disease. During this research it is expected to:

- **Promote science-based knowledge** to overcome the landscape of myths and legends surrounding disease and management.
- **Collect information to compare the severity and impact of mange** across the range of SAC, and identify possible common predictors of serious mange infestations.
- **Facilitate the exchange of information between the livestock, wildlife and human sectors**, for the development of ecologically informed management plans that mitigate the impacts of diseases by informing and supporting central animal health agencies.

Subject of the research:

South American Camelids (SAC): vicuña (*Vicugna vicugna*) and guanaco (*Lama guanicoe*)

Research Questions:

Four major issues have been identified that will be addressed throughout this research: prevalence of mange in SAC, environmental factors associated with mange, factors in the management of SAC associated with mange, and effectiveness of veterinary treatments. For each theme, main research questions were identified:

Theme	Main question
Prevalence and severity of the disease and its impacts on populations	How is the prevalence of mange in SAC? (¿Cómo es la prevalencia de la sarna en los CSA?)

Environmental factors related to the appearance, spread and prevalence of the disease	Are environmental conditions correlated with mange prevalence? <i>(¿Las condiciones ambientales están correlacionadas con la prevalencia de la sarna en CSA?)</i>
Management factors related to the appearance, spread and prevalence of the disease	Does management increase mange prevalence? <i>¿El manejo de los CSA para el aprovechamiento de fibra y carne aumenta la prevalencia de la sarna?</i>
Veterinary treatments and effectiveness	What is the effectiveness of the veterinary treatments implemented? <i>¿Cuál es la efectividad de los tratamientos veterinarios implementados para el control de la sarna en CSA?</i>

For each question, key sources of heterogeneity were identified that should be taken into account for the evaluation, which allowed the development of secondary questions that seek to direct the research in greater detail. These questions are:

Theme	Secondary questions
Prevalence and severity of the disease and its impacts on populations	<ul style="list-style-type: none"> ● Is the prevalence of mange in SAC different by locality? ● Have there been temporal variations in the prevalence of mange in SAC populations? ● What factors are associated with the prevalence of mange in SAC: ecological, management, etc? ● Is the density of SAC related to the prevalence of mange? ● Is the prevalence of mange in SAC associated with the prevalence of the disease in other animals (wild and domestic) with which it shares the habitat? ● Can we speak of a pattern of contagion that allows us to evaluate casualties? ● Is there evidence of variations in the prevalence of mange in SAC and genetic variability?

	<ul style="list-style-type: none"> • What is the local perception about the prevalence of mange in SAC?
<p>Environmental factors related to the appearance, spread and prevalence of the disease</p>	<ul style="list-style-type: none"> • Do local and regional climatic variations have any effect on the occurrence and prevalence of mange in SAC? • What ecological factors (food availability, water availability, among others) are associated with the occurrence and prevalence of mange in SAC? • What factors are associated with the decreased availability and quality of food and water that could be associated with the occurrence and prevalence of mange in SAC? • Is the prevalence of mange linked to the degree of protection of the habitat of the SAC? • Is there any ecological factor (natural or human-made) that determines the appearance and prevalence of mange in SAC? • Do ecological factors linked to the occurrence and prevalence of mange in SAC vary regionally or temporally? • According to local perceptions, what are the most important ecological factors for the emergence and prevalence of mange in SAC?
<p>Management factors related to the appearance, spread and prevalence of the disease</p>	<ul style="list-style-type: none"> • Are there differences in the prevalence of mange in SAC depending on the type of management: silvestry vs. semi-captivity? • Are there differences in the prevalence of mange in SAC when domestic animals are present? • Can the presence of fences be linked to a higher prevalence of mange in SAC? • What is the key or critical step in the management of disease transmission in SAC? • How do local residents perceive the appropriateness of the implemented SAC management practices: good practices vs. bad practices?

	<ul style="list-style-type: none"> • What is the local perception about the possible relationship between management and the onset and prevalence of mange in SAC?
<p>Veterinary treatments and effectiveness</p>	<ul style="list-style-type: none"> • Are there differences in the effectiveness of the drugs implemented for the treatment of mange in SAC? • What is the determining factor for the effectiveness of the treatment? • Is the effectiveness of treatment related to the percentage of the population of SAC covered? • Are there temporal or spatial variations in the effectiveness of treatments? • What factors determine the implementation of a specific treatment at a specific location or time? • What is the local perception about the effectiveness of mange treatment in SAC?

Indicators and factors:

To evaluate the different questions, a series of indicators is proposed to characterize the intensity of mange and its effects on the populations of SAC, as well as the way in which this situation is perceived by the local population. Additionally, factors (continuous and categorical) that should be taken into account when evaluating these indicators, as well as comparators that will be used throughout the review, were identified.

These details are shown below:

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Theme	Indicators	Factors	Levels	Comparators
<p>Prevalence and severity of the disease and its impacts on populations</p>	<p>Prevalence of mange:</p> <ul style="list-style-type: none"> Percentage of mange-positive individuals in relation to the total number evaluated Percentage of individuals with lesions compatible with mange in relation to the total evaluated <p>Degree of severity:</p> <ul style="list-style-type: none"> Number of different mange lesions per individual Percentage of body affected by mange per individual <p>Mortality:</p> <ul style="list-style-type: none"> Number of dead individuals with lesions compatible with mange <p>Local perception:</p> <ul style="list-style-type: none"> Percentage of local stakeholders with knowledge of the prevalence of mange in camelids Percentage of individuals with lesions compatible with mange according to local perception 	<p>Countries Political district boundaries Capture/management locations</p> <p>Subspecies Camelids age Camelids sex Morphologic characteristics Camelids population density</p> <p>Genetic variability Spatial distribution of genetic populations Parasite load</p> <p>Veterinary treatment</p> <p>Prevalence of mange in domestic camelids Prevalence of mange in other wild species Prevalence of mange in domestic animals</p>	<p>Perú, Bolivia, Chile, Argentina Department/Province/District Communities</p> <p>Adult, Juvenile, Breeding Females, Males</p> <p>Continuous variable</p> <p>Populations with and without treatment</p> <p>Continuous variable Continuous variable Continuous variable</p>	<p>Spatial Temporary Species</p>

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<p>Environmental factors related to the appearance, spread and prevalence of the disease</p>	<p>Prevalence of mange:</p> <ul style="list-style-type: none"> Percentage of individuals positive for mange in relation to the total evaluated Percentage of individuals with lesions compatible with mange in relation to the total evaluated <p>Degree of severity:</p> <ul style="list-style-type: none"> Number of different mange lesions per individual Percentage of body affected by mange per individual <p>Mortality:</p> <ul style="list-style-type: none"> Number of dead individuals with lesions compatible with mange <p>Local perception:</p> <ul style="list-style-type: none"> Percentage of local stakeholders who consider that there is an effect of environmental factors on the prevalence of mange in camelids. 	<p>Temperature Precipitations Climatic phenomena Altitude</p> <p>Habitat types Habitat availability Food availability Food quality Water availability</p> <p>Protected areas</p> <p>Use of land/human activities Types of hazards Intensity of hazards</p>	<p>Continuous variable Continuous variable Niña, Niño Continuous variable</p> <p>Continuous variable Continuous variable Continuous variable</p> <p>Inside and outside protected areas</p>	<p>Spatial Temporary Species</p>
<p>Management factors related to the appearance, spread and prevalence of the disease</p>	<p>Prevalence of mange:</p> <ul style="list-style-type: none"> Percentage of individuals positive for mange in relation to the total evaluated Percentage of individuals with lesions compatible with mange in relation to the total evaluated <p>Degree of severity:</p>	<p>Management types Frequency of shearing Chaku practices</p> <p>Infrastructure</p> <p>Handling or clamping</p> <p>Shearing time</p>	<p>Silvestry, Semi-captivity Continuous variable Good practices vs. bad practices</p> <p>Closed, soft fences Number of people, zones, use of hoods No more than 7 min Manual, Mechanic</p>	<p>Spatial Temporary Species</p>

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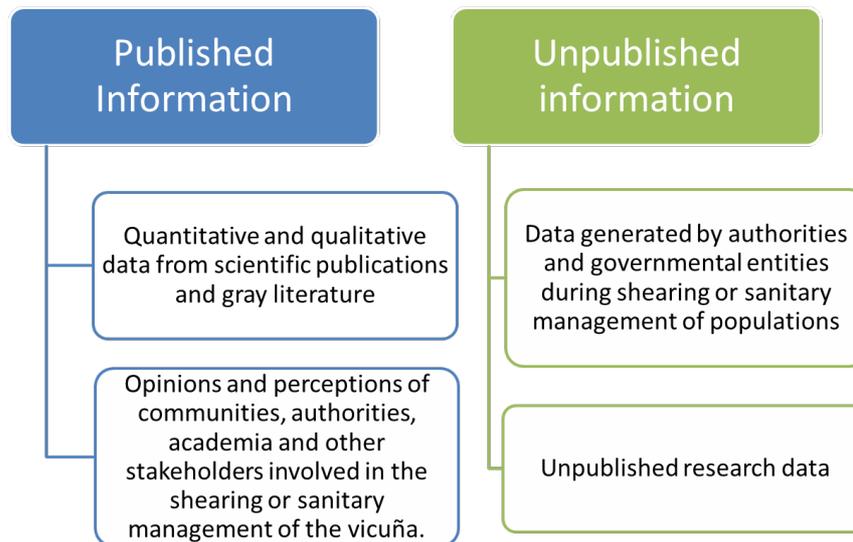
	<ul style="list-style-type: none"> Number of different mange lesions per individual Percentage of body affected by mange per individual <p>Mortality:</p> <ul style="list-style-type: none"> Number of dead individuals with lesions compatible with mange <p>Local perception:</p> <ul style="list-style-type: none"> Percentage of local stakeholders that recognize the implementation of bad management practices for camelids Percentage of local stakeholders that consider that there is an effect of management on the prevalence of mange in camelids 	<p>Shearing type</p> <p>Domestic camelids Domestic livestock</p> <p>Fences Semi-captivity time</p>	<p>Presence, Absence or Density Presence, Absence or Density</p> <p>Surface Semi-captivity time</p>	
Veterinary treatments and effectiveness	<p>Degree of severity:</p> <ul style="list-style-type: none"> Number of different mange lesions per individual Percentage of body affected by mange per individual <p>Fiber growth:</p> <ul style="list-style-type: none"> Presence of fiber in the area with mange lesions <p>Drug effectiveness</p> <p>Local perception:</p>	<p>Drug types Drug concentration Dose: amount per kg Dosage: frequency of administration Route of administration/application</p> <p>Number of individuals treated Degree of disease severity</p> <p>Camelid age Camelid sex</p> <p>Alternative treatment Alternative treatment types</p>	<p>Continuous variable Continuous variable</p> <p>Continuous variable Low, Moderate, High</p> <p>Adult, Juvenile, Breeding Male, Female</p> <p>Presence, Absence</p>	<p>Spatial Temporary Species</p>

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	<ul style="list-style-type: none">• Percentage of local stakeholders that accept veterinary treatments to combat mange in camelids• Percentage of local stakeholders that consider veterinary treatments to be effective in combating mange in camelids			
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Information sources:

The research is based on existing information on the South American wild camelid species and the impact of mange, as well as on a study of perceptions that different actors linked to the research topic may have on the prevalence of scabies, the factors linked to the prevalence of mange and the effectiveness of veterinary treatments. For this, we will work with two sources of information: published information and unpublished information.



With the published information, a systematic review will be carried out in search engines, specialized sources, among others, considering scientific literature, reports, institutional and non-institutional documents, theses, unpublished works, among others. The systematic review of the information will be carried out using the bases established by the Center for Evidence-Based Conservation (Sutherland, et al. 2004). Studies with quantitative data of the defined indicators will be included, as well as qualitative data that contribute to answering the research questions. All the information will go through a quality selection and evaluation process (according to the Pullin and Knight 2001 and 2003 methodology) and will be organized in databases for analysis.

The unpublished information that is expected to be collected comes mainly from government institutions such as SERNANP, SERFOR and regional governments in Peru, the DGBAP in Bolivia, among others. This information consists mainly of records of vicuñas and guanacos obtained during management practices, sanitary chacus and censuses, and that provide

important information for the investigation. Additionally, information will be collected from unpublished research that may contribute to answering the questions posed. In each case, and with participation and recognition of ownership of the data of the different institutions, the current state of the information will be evaluated, adjustments and improvements will be proposed for the organization of the information in databases and the records provided will be updated to be able to be used in the different analyzes.

Analysis of data

In case of obtaining sufficient quantitative data for the proposed indicators, from each of the consulted information sources, they will be carried out from semi-quantitative and secondary analyzes using descriptive statistics methods, or meta-analysis. The statistical treatments that will be used to analyze the data will vary depending on the type and amount of data. All quantitative data will be summarized in tables so that they can be contrasted and analyzed in an orderly manner.

Formation of the working group Diseases in wild South American camelids:

Recognizing that the greatest challenges to conservation and sustainable development require innovative solutions, the Science for Nature and People Alliance (SNAPP) aims to seek quick, tangible and lasting benefits for conservation and sustainable development. This from collaborative work between teams of people from various organizations to conceive ideas, systematize and analyze data and provide solutions to the challenges faced by people and nature. In this case, the working group "Diseases in wild South American camelids" will be formed so that, in a collaborative way, and using the information previously ordered, systematized and analyzed, the results are discussed and management strategies are found to control scabies with in order to promote the health of these species, their ecosystems, the associated livestock and the human communities that depend on the management of these species. The collaborative work seeks to group and generate links between experts from different disciplines and representatives of government and civil society associated organizations in charge of and with an interest in the management and conservation of these species.

Products expected to be generated:

From this research it is expected to generate the following series of products:

- Articles in high impact scientific journals in English and Spanish.
- Databases available to other researchers.
- White paper on health problems in South American camelids.
- Briefing notes on the challenges and findings regarding scabies in South American camelids.
- Technical directives for the management of the vicuña in Peru and Bolivia.
- Summary of policy recommendations for the four countries where wild South American camelids are found.
- Results presentation event.

Suggested quote:

Isasi-Catalá, E., Gallegos, A., Hostos-Olivera, L., Martin, A., Walzer, C., Salgado-Caxito, M., Beltrán-Seminario, F., Montoya, M., Smith, S., Dougnac, C., Gaynor, K., Wallace, R., Camata, D., De la Cruz, F., Mena, J.L., Colchao, P. (2023). *Bases de Datos de la revisión sistemática del proyecto Abordando los impactos de la sarna sarcóptica en camélidos sudamericanos silvestres a través de un paisaje de mitos y leyendas*. Wildlife Conservation Society.

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References cited

Pullin, A.S. and Knight, T.M. (2001) 'Effectiveness in Conservation Practice: Pointers from Medicine and Public Health', *Conservation Biology*, 15(1), pp. 50–54.

Pullin, A.S. and Knight, T.M. (2003) 'Support for decision making in conservation practice: an evidence-based approach', *Journal for Nature Conservation*, 11(2), pp. 83–90. Available at: <https://doi.org/10.1078/1617-1381-00040>.

Sutherland, W.J. et al. (2004) 'The need for evidence-based conservation', *Trends in Ecology & Evolution*, 19(6), pp. 305–308. Available at: <https://doi.org/10.1016/j.tree.2004.03.018>.