

# ANNUAL SURVEY PAPER ASP 2023

*Can a butterfly flapping its wings in Brazil set  
off a tornado in Texas ?*

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off a tornado in Texas?*

Edward LORENZ (Meteorologist), 1972

(The "Butterfly Effect", a metaphor for Chaos Theory's  
fundamental sensitivity to initial conditions)



Decision-makers today must contend with new realities that unfold at a pace faster than ever before. There is heightened interest since the pandemic - across all sectors - in spotting emerging issues, exploring optimal ways of addressing these, and tackling today's challenges more effectively.

Climate change, financial equity, generational value shifts, geopolitical tensions, new development models, artificial intelligence prospects, lifestyle reassessments: how do we keep abreast of these developments?

Decision-makers and stakeholders need to step up and broaden alertness levels to encompass the full spectrum of emerging trends<sup>\*1</sup>, so as to stay abreast of both short and medium-term uncertainties.

**This annual Royal Institute for Strategic Studies (IRES) publication seeks to inform public and private stakeholders and decision-makers of key emerging trends to consider when drawing up short- and medium-term strategies and action plans.**

This yearly synthesis of the Institute's exploratory foresight activities is designed to supplement and complete key emerging trends observed over the past twenty years (see next page).

While not exhaustive, it focuses on selected trends within each of the five pillars that constitute IRES' reading grid, highlighting how they impact Morocco, its natural environment, its population, its economy, and its future.

The digital and audio editions of this report can be accessed on the *IRES Intelligence Platform* (<https://www.ires.ma/iip/>). Additional data is also available.

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<sup>1</sup> All terms followed by an asterisk are defined in the appended glossary.

## KEY STRUCTURAL EMERGING TRENDS

IRES interprets current and future developments according to a five-pillar framework: exponentiality, planetization, governance, human-centric and nature-centric.

Human civilization entered a phase of Great Transition about a century ago: the rules that shaped the world over the past few millennia (shapers) are giving way to new ones. As change accelerates, bringing with it major structural crises, new emergences foreshadow the outlines for the world to come.

In this radically shifting landscape, ever more volatile, uncertain, complex and ambiguous (VUCA), three distinct evolutionary trends emerge, with clearly discernible major disruptive forces since the turn of the century. This meta-grid illustrates the current situation.

### THE EVOLUTION OF HUMANS AND THE SOCIETIES THEY FORM

- Individuals: Individualism, Alien Gen (digital natives and mutants).
- Human societies: Disassociation, freedom/security pendulum, Liquid Society (disappearing binary characterization of individuals).
- Authority structure: Democracy, governance, collective intelligence, soft power.

Digitalization has radically reshaped the way people live, work, and interact, in areas ranging from education and commerce to media, healthcare, and administrative relations.

Digital platforms (Uber, Airbnb, Amazon) have altered the economic landscape, creating new business models built around sharing and convenience (sharing economy, result economy).

China has become a major economic power in the last 20 years, weighing heavily on the global economy and international politics.

### TECHNOLOGY AS AN INSTRUMENT OF HUMAN ACTION

- Increasingly digitalized and electrified technical instrumentation.
- Biotechnology altering the human genome.
- Generalized incorporation of artificial intelligence.
- Next tech: future development of nuclear fusion, broader adoption of additive manufacturing, virtualization of human activities (metaverses, augmented reality, cyber-protection, ...).

Artificial intelligence and robotic automation have become mainstream, from autonomous vehicles to personal virtual assistants and advanced manufacturing, all of which impact the future of work.

The sequencing of the human genome, advances in gene therapy and biotechnology, along with Artificial Intelligence in healthcare, drive the emergence of increasingly customized and specific healthcare.

#### TRENDS IN CIVILIZATION AND ITS INTERACTION WITH NATURE

- Anthropocene: civilization based on exploiting and controlling nature (essentially for economic purposes).
- Planetization: appropriation and use of the entire planet.
- Gradual reaching of planetary boundaries: human species' ability to survive on the planet is threatened.

Confronted with the climate crisis, an increasing number of governments and businesses are committing to initiatives designed to reduce carbon emissions and promote sustainable development and energy transition: renewable energies, circular economy, and sustainable agricultural practices...

Globalization is about to wind down, giving way to a state of globality in which virtually any point on the planet is accessible to any individual.

This overview will be supplemented annually with emerging trends identified and presented in this new collection of IRES publications.

## ANNUAL SURVEY PAPER: OPERATING INSTRUCTIONS

Each of the emerging trends identified in this report is broken down according to the five pillars of the IRES reading grid:

- **Human-centric:** all developments and aspirations that help reshape Humanity, in terms of its uniqueness and social nature, as well as its relationship with machines, with work, with its surroundings...
- **Nature-centric:** the pursuit of a different relationship with the living world, a more environmentally-friendly economy, and a less consumer-oriented lifestyle; the realization that we now need to protect nature and all living things.
- **Exponentiality:** all structural phenomena that accelerate exponentially, such as communication technologies, digitalization, demographics, economic competition, financialization, and social inequalities...
- **Planetization:** a new, disruptive level of progress, in which a post-globalization state of globality coexists with a new awareness of the planet's "living" quality, as a biosphere of which humans are only one component.
- **Governance:** all collective action management processes, based on bottom-up stakeholder action and agent mobilization and motivation (concerted action, soft power).

A synthetic presentation (radar) at the beginning of this report (page 10) provides an overview of all these items.

The presentation of each emerging trend is broken down as follows:

1. Relevant component.
2. Title.
3. Definition (a more concise definition can be found in the Glossary).
4. Emerging trend description and current context.
5. General problem.
6. Implications for Moroccan public or private decision-makers.

Emergences are arranged in alphabetical order under each of the five pillars. They are intended to encompass as wide a range of fields as possible.

A glossary of terms marked with an asterisk and of each emerging trend\*, as well as a list of acronyms used, appear at the end of this publication.

Twice a year, this publication will be digitally enriched by new **emerging concepts**, accessible via the ASP page of the IRES Intelligence Platform (<https://www.ires.ma/iip/en/>).

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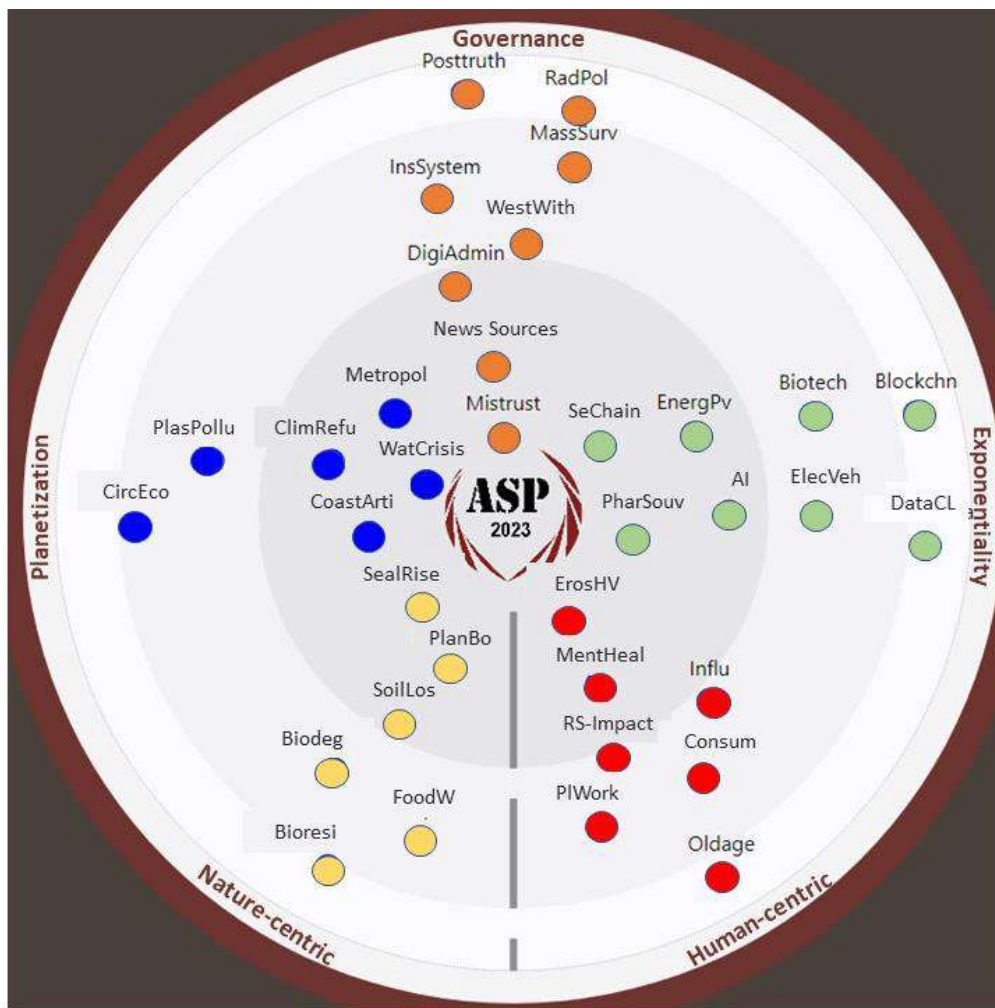
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## HIGHLIGHTS OF 2023

From a structural perspective, 2023 stands out for the following:

- Difficulty restoring supply chains and persistent weakness in the global economy.
- Multiverse market immaturity, still at the embryonic stage.
- NGO mobilization to protect the seabed in the face of global governance's inaction (cf. IRES Strategic Report on the future of the ocean), thereby sustaining a trend, noted during the pandemic, of greater civil society expression in support of nature conservation.
- Rising oil prices prompting countries to rethink energy transition policies.

# MAPPING 2023 EMERGING TRENDS



HUMAN-CENTRIC	NATURE-CENTRIC	GOVERNANCE	EXPONENTIALITY	PLANETIZATION
<p><b>Menthealth :</b> Deteriorating mental health</p> <p><b>ErosHV:</b> Erosion of human values</p> <p><b>RSImpact:</b> Social media impacts on young people</p> <p><b>Influ:</b> Influencers</p> <p><b>PIWork:</b> The place of work</p> <p><b>Consum:</b> Challenging consumerism</p> <p><b>Oldage:</b> Aging global population</p>	<p><b>Biores:</b> Bioresistance</p> <p><b>Biodeg:</b> Biodiversity degradation</p> <p><b>SeaRise:</b> Rising sea levels</p> <p><b>FoodW:</b> Food waste</p> <p><b>Soilloss:</b> Soil fertility loss</p> <p><b>PlanBo:</b> Towards planetary boundaries</p>	<p><b>DigiAdmi:</b> Digitalizing administrative services</p> <p><b>NewsSource:</b> Exponential proliferation of news sources</p> <p><b>Mistrut:</b> Losing confidence in political elites</p> <p><b>Posttruth:</b> Post-truth</p> <p><b>RadPol:</b> Radicalization of politics</p> <p><b>InsSyst:</b> International institutions called into question</p> <p><b>WestWith:</b> Western withdrawal</p> <p><b>MassSurv:</b> Mass surveillance</p>	<p><b>Biotech:</b> Biotechnology</p> <p><b>BlockC:</b> Blockchain</p> <p><b>DataC:</b> Data cloudification</p> <p><b>PhotoSol:</b> Photovoltaic solar energy</p> <p><b>AI:</b> Artificial Intelligence</p> <p><b>SecChain:</b> Securing supply chains</p> <p><b>Pharsov:</b> Pharmaceutical sovereignty</p> <p><b>ElecVec:</b> Electric Vehicles</p>	<p><b>CoastArti:</b> Coastal artificialization</p> <p><b>WatCrisis:</b> Global freshwater crisis</p> <p><b>CircEco:</b> Circular economy</p> <p><b>Metropo:</b> Metropolization</p> <p><b>ClimRefege:</b> Climate refugees</p> <p><b>Plastpollu:</b> Critical threshold for plastic pollution</p>

## HUMAN-CENTRIC

### AGING GLOBAL POPULATION

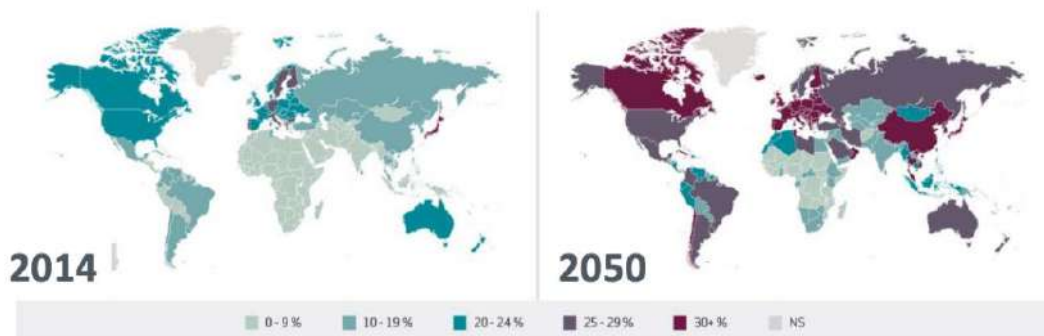
Worldwide population aging describes the growing proportion of older people, generally defined as those aged 65 and over, in the total population. This is driven by rising life expectancy and declining birth rates across a wide range of countries.

The WHO predicts that the global population of people aged 60 and above will have doubled to 2.1 billion, by 2050. The number of people aged 80 and above is expected to triple from 2020 to 2050, reaching 426 million<sup>1</sup>.

Population aging is a complex issue. On one hand, it puts pressure on healthcare and pension systems, impacts the economy and labor market, and entails adjustments across a number of areas, from urban planning to technology.

On the other hand, the contribution of older people to society should be recognized and valued. It is, therefore, crucial, going forward, that we promote healthy, active aging and guarantee the rights and well-being of the elderly.

In Morocco, the High Commission for Planning (HCP) estimates that in 2021, 11.7% of the total population is aged 60 and above (nearly 4.3 million people), compared to 8% in 2004 (2.4 million). The High Commission Planning's demographic projections predict that "by 2030, the number of people aged 60 and over will have risen to just over 6 million, a 42% increase over 2021, and will account for 15.4% of the population".<sup>2</sup>



*Proportion of the population aged 60 and above  
(Source: United Nations, Population Division)*

## CHALLENGING CONSUMERISM

Consumerism\*, or the act of consuming beyond one's immediate needs, is a growing global concern. As environmental and social impacts grow, it is essential to question excessive consumption.

Overconsumption has, since the end of the Second World War, led to unprecedented levels of natural resource depletion, massive waste production, and the emergence of severe environmental problems including climate change, plastic pollution and ecosystem degradation. It has also generated greater socio-economic disparity and household debt.<sup>3</sup>

Consumers are changing, reflecting a growing awareness of the unsustainability of this model: consumer demands and empowerment are on the rise, as is consumer responsibility and resistance. Movements such as Enoughism and Minimalism<sup>4</sup> have emerged with one clear principle: living with fewer goods does not imply living worse.

With rising educational levels, skills, and standards, Moroccan consumers are no longer passive agents in their relationship with consumption. The unprecedented and strongly supported 2018 boycott movement in Morocco is a case in point.<sup>5</sup>

## DETERIORATING MENTAL HEALTH

Mental health\* or mental well-being enables people to cope with life's stresses, make the most of their abilities, learn effectively, work and contribute to their communities. It is an integral component of health and well-being, and underpins individual and collective abilities to make decisions, build relationships and shape the world we live in.<sup>6</sup>

According to the WHO, mental disorders afflict over 450 million people, and rising, driven by a combination of the stresses of daily life, social and economic pressures, conflict, natural disasters (eco-anxiety) and more recently, the Covid-19 pandemic.

This global deterioration in mental health is further exacerbated by the stigma surrounding mental disorders, limited access to care, and an increased prevalence of problems associated with emotional well-being.

The issue of mental health is of particular importance in Morocco: a 2005 survey conducted jointly by the Ministry of Health and the WHO found that 48.9% of Moroccans suffered from at least one mental health disorder, with a higher prevalence among women and younger people.<sup>7</sup>

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## EROSION OF HUMAN VALUES

Human relations within a society are typically rooted in respect for so-called "human" as opposed to "inhuman" values, such as kindness, equity, benevolence, respect for others and their dignity, generosity, and compassion...

A host of factors dehumanize human relations today: online communication, lacking in warmth and compassion; fast-paced present-day life, leading to inconsiderate and even inappropriate behavior; techno-bureaucracy, with little compassion for those administered; socio-economic inequality, creating a strong sense of injustice... Conflicts arising from competition (economic, sporting or educational) inhibit sharing, mutual aid, and empathy, all of which are essential for effective, positive relationships between individuals.

Yet, faced with the upcoming global challenges of climate change and resource scarcity, healthier human relations are essential to building more cohesive societies, capable of withstanding escalating tensions.

Despite Morocco's rich history of conviviality and respect, it is not immune to the negative influences of global dehumanization. Addressing these challenges issues means promoting initiatives that foster empathy, respect, and dignity among citizens.

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## INFLUENCERS

Influencers\*, often major players in digital marketing, are people who, via their prominent presence on social networks, exert considerable influence on their followers, potentially shaping opinions, purchasing behavior, and consumer trends.

The influencer phenomenon is exploding worldwide: worth \$1.7 billion in 2016,<sup>8</sup> influencer Marketing's market size hit \$16.4 billion in 2022 and is projected to reach \$21.1 billion in 2023, for a 29% increase.<sup>9</sup>

While influencers can play a positive role for Internet users, there are growing concerns about this activity: unrealistic standards and comparisons; promotion of materialism and consumerism; lack of authenticity and transparency; misinformation and pseudoscience; unethical practices... It is therefore essential to preserve the integrity and authenticity of influencer marketing, for consumers and brands alike.

Morocco is squarely impacted by this emerging trend: 75% of Internet users follow influencers on social networks<sup>10</sup>; some 60,000 Moroccan influencers (up from only 1,400 in 2018) play an expanding role in promoting local and international brands, generating sales of €300 million. Moroccan companies have also started to leverage content creator influence to reach target audiences more effectively.

## SOCIAL MEDIA IMPACTS ON YOUNG PEOPLE

The impact of social media\* on young people refers to the impact of platforms such as Facebook, Instagram, Twitter, TikTok, and others on the behavior, attitudes, and well-being of young people.

Social media adoption by young people is a global trend that has surged over the past decade. According to a 2018<sup>11</sup> Pew Research Center study, 95% of teenagers in the US have access to a smartphone, and 45% are online almost constantly. Social networks have become a central aspect of young people's lives, shaping their social interaction, access to information, and social contribution.

While social networks facilitate learning, civic engagement, and creativity, they also can fuel problems ranging from cyberstalking to misinformation, screen addiction, and deteriorating mental health. Hence the emphasis on healthy, responsible use of social networks.

Young Moroccans are not immune to the popularity of social networks: in 2022, for instance, 60% of Morocco's 19 million Facebook users were aged 18 to 34.<sup>12</sup> It is therefore vital to strike a balance between the real and online worlds, to preserve and promote the health and well-being of younger generations - the foundation of present and future development.

In this respect, it might be appropriate to devise a specific Social Media policy, ensuring balance between freedom of expression and preservation of public order.

## THE PLACE OF WORK

The "place of work" relates to the importance and role of work in the lives of individuals and society (both paid and unpaid work including domestic work and voluntary work). Work contributes to personal identity, economic subsistence, social participation, and self-realization.

Technological, economic, and social changes have transformed the nature of work, with a rise in remote working, self-employment, and precarious employment. At the same time, developments in the status of women call into question their sometimes disproportionate role in unpaid work. Work's place in society is therefore in a state of flux, raising questions about work-life balance, gender equality, job security, and social protection.

Younger generations (millennials, Gen Z, ...), nearly 30% of the global workforce by 2025, have developed new aspirations and priorities for their work environment: more humanity, empathy, inclusiveness, equality, and respect, all of which employers should take into account to prevent destructive turnover (war for talent).

Creating decent jobs, valuing unpaid work, and guaranteeing people's well-being and fulfillment at work will all be essential.

The Kingdom is all the more confronted with this issue in light of its sizeable younger population (16.2% of the total 2021 population is aged 15 to 24)<sup>13</sup> and changing labor market, with greater weight attributed to the service sector, informal employment, and migration.

Faced with youth unemployment and workplace gender inequality, Morocco should embrace the opportunity offered by universal social protection to incorporate the informal sector and considerably reduce job insecurity.

## NATURE-CENTRIC

### BIODIVERSITY DEGRADATION

Biodiversity degradation\* has to do with the decline or loss of biological variability within an ecosystem, including fewer species, smaller populations, and reduced genetic diversity, often due to anthropogenic factors such as land-use conversion, pollution, overexploitation of plants and animals, and climate change.

The 2019 Intergovernmental Science-Policy Platform Assessment of Biodiversity and Ecosystem Services highlighted that biodiversity degradation is accelerating at a rate unprecedented in human history (one million species face extinction). The "Living Planet 2022" global index shows an average decrease of 69%<sup>14</sup> in the population of wild species observed between 1970 and 2018.

Morocco's biodiversity is the richest in the Mediterranean, after that of the Anatolian region (Turkey), with an overall endemism rate of 11% for fauna and 25% for vascular plants. Morocco is the world's 12th largest exporter of medicinal and aromatic plants, with 52,000 metric tons of plants and 5,000 metric tons of essential oils (1.2 billion Moroccan dirhams).<sup>15</sup>

Particularly vulnerable to deforestation, pollution, overexploitation of resources, and climate change, the Kingdom has adopted measures to preserve, restore, and manage ecosystems, such as the 2016-2020 National Biodiversity Strategy and Action Plan.<sup>16</sup> Nonetheless, Morocco now needs to step up implementation of these measures if it is to outpace biodiversity degradation.

### BIORESISTANCE

Bioresistance\* encompasses the resistance of specific harmful bacteria, viruses and pests to antibiotics, pesticides, antiviral treatments, and genetically modified organisms.

While not new, this phenomenon has become increasingly alarming over the years. First, because the proportion of resistant organisms is on the rise, and this resistance stems from an increasingly swift natural selection process: there is no turning back. Second, because it reduces human's ability to act on nature.



The WHO identifies antibiotic resistance as one of the greatest threats to global health, food security, and development.<sup>17</sup>

Morocco is concerned enough by this emergence<sup>18</sup> that an Antimicrobial Resistance Strategic Plan (24-09-2019) was set up as part of Health Plan 2025.<sup>19</sup> Still, engaging all partners, including the private sector, to establish specific regulatory frameworks and take practical action on bioresistance, remains a decisive milestone.

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## FOOD WASTE

FAO defines food waste\* as a deterioration in the quantity or quality of food as a consequence of the decisions and actions of retailers, food service providers, and consumers.<sup>20</sup>

Roughly one-third of all food produced for human consumption worldwide is wasted each year, amounting to \$400 billion. That is around 1.3 billion tons of food, when 690 million people suffered from undernourishment in 2019 (FAO) and 3.1 million children under the age of 5 die each year from malnutrition (NGO Save the Children, 2018), and both figures rising since Covid-19.

The indirect effects of uneaten food are not insignificant: its production draws on scarce resources (water, soil, energy) and its decomposition generates methane, a potent greenhouse gas.

Every year, the average Moroccan discards 91 kilograms of food<sup>21</sup>: Food waste occurring in the final stages of the supply chain.<sup>22</sup> Better packaging solutions should help cut food loss and waste, by extending shelf life and protecting from contamination...

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## RISING SEA LEVELS

Gradually rising sea levels are driven by seawater heat expansion and ground ice melt, and significantly impact coastal areas (erosion, flooding, disruption of coastal ecosystems, and human displacement).

The effects of rising sea levels, a threat to over one billion people by 2050, are set to escalate, and the prevalence of extreme events is set to grow,<sup>23</sup> according to the IPCC 2022. Low-lying, unprotected coastal areas face the greatest risk.

Morocco is directly exposed to rising sea levels, owing to the shallow topography, urban concentration, and ecological, economic, and touristic value of its coasts. It is therefore essential to develop the means to monitor these zones and anticipate future impacts (population relocation, coastal protection systems, ...).<sup>24</sup>

## SOIL FERTILITY LOSS

Soil fertility loss\* refers to a soil's diminished capacity to support plant growth, usually as the result of erosion, intensive use, or unsustainable farming practices. This often includes depletion of essential nutrients, loss of organic matter, degradation of soil structure, and depletion of soil biodiversity. This results in soils that are poor in nutrients and living organisms, with reduced porosity (and therefore susceptible to leaching).

At current rates of fertile land use, 90% of the planet's arable land will be degraded by 2050.<sup>25</sup>

The share of arable land in Morocco's total land area has fallen from 20.4% in 1994 to 17.1% in 2020.<sup>26</sup> Deforestation is the primary factor of land degradation<sup>27</sup>, also contributing to higher drought intensity, forest fires, and soil erosion.

## TOWARDS PLANETARY BOUNDARIES

The nine planetary boundaries\* (ROCKSTRÖM, 2009) set critical thresholds not to be breached to preserve an environment able to sustain human life on the planet. They encompass climate change, biodiversity erosion, nitrogen and phosphorus cycles, ocean acidification, global freshwater use, land-use change, chemical pollution, atmospheric aerosol, and ozone depletion. Staying within these boundaries is crucial to a sustainable future.

And yet since the early 21<sup>st</sup> century, we approach them at an accelerating pace, notable in terms of soil degradation, CO<sub>2</sub>, nitrogen and phosphorus emissions, biodiversity depletion, and freshwater overutilization\*. Improvements have been made in reducing emissions of toxic pollutants (aerosols) and ozone-depleting substances (chlorofluorocarbons), but these are insufficient, fragmented, and localized.

Morocco already faces daunting challenges with regard to climate change, dwindling water resources, deforestation, land degradation, and biodiversity loss. Signatory to the Paris Agreement, the Kingdom deploys considerable resources to the energy transition, water capital management, and environmental education, all of which should be stepped up and accelerated.

## GOVERNANCE

### DIGITALIZING ADMINISTRATIVE SERVICES

Digitalization\* has swept across all sectors of human activity, including public services and administration. Public services are increasingly going digital, be it for offering general public services (taxes, civil status, administrative documents) or holding elections. France, the United Arab Emirates, South Korea, and Singapore already lead the way in this area.<sup>28</sup>

Digitizing government services can significantly speed up administrative procedures, combat corruption and optimize public sector operations.

Morocco is committed to this approach, having implemented its national e-government strategy in 2009. The country began the digital transition of its administrative services in the wake of the advent of the Covid-19 pandemic in 2020.<sup>29</sup>

Training the right human resources, significantly increasing connectivity by building high-speed networks, ensuring interoperability between government and public service information systems, developing sovereign clouds, and enhancing cybersecurity are all crucial to successfully completing this digital transition.

### EXPONENTIAL PROLIFERATION OF NEWS SOURCES

Alongside conventional news channels, an entire nebula of unregulated content producers (websites, blogs, YouTube channels, ...) has now emerged. The sheer number of news sources\* worldwide has mushroomed with the Internet, and news-gathering speeds have almost doubled.

Yet while this proliferation of news sources brought benefits, notably diversified points of view, access to specialized information, and empowering individuals to express themselves, it has also brought challenges, including fake news, misinformation, the manipulation of public opinion, and making it increasingly difficult for individuals to sort out and gauge news quality. So-called "fake news" is a particularly good illustration of this.

Morocco is directly impacted by this trend, be it through locally-generated or imported fake news.<sup>30</sup> Awareness-raising campaigns, fact-checking initiatives, and regulatory measures are in place to encourage responsible news practices. But vigilance remains essential, particularly with regard to urban populations in constant contact with the outside world, and disadvantaged populations vulnerable to manipulation by extremist movements.

## INTERNATIONAL INSTITUTIONS CALLED INTO QUESTION

While challenges to, and calls for international institution reform are by no means a novelty, they have gained considerable momentum in recent decades.

Over the past decade, states such as the USA and Israel have gone so far as to leave long-standing international organizations such as WHO and UNESCO, while others, notably Ukraine, have officially called for UN reform.<sup>31</sup>

The loss of confidence in international institutions by global political players is likely to lead to a breakdown of the multilateral system as established in 1945. This could ultimately lead to a major reconfiguration of the world stage.

Morocco actively contributes to multilateralism and the international system. In the event of a reconfiguration of the latter, the Kingdom could find itself at the intersection of opposing blocs, alongside influential countries such as India, but neutral on a range of global issues.

## MASS SURVEILLANCE

Mass surveillance\* refers to the systematic, large-scale collection of data and information on large numbers of people, often without specific targeting or individual justification.

Mass surveillance tools continue to proliferate, from satellites, cell phones and GPS to urban cameras, biometric systems, financial surveillance, e-mail and Internet monitoring, and social media infiltration.

It is essential to reconcile the need to ensure the safety and security of individuals (money laundering, terrorism, ...) with the need to respect the privacy of citizens, jeopardized by the proliferation of surveillance tools.

Personal data protection is also an issue for Morocco, as its citizens may be subject to unwanted surveillance wherever they may be on the planet, via cell phone or Internet usage data collection. An assertive policy to protect individual rights would therefore prove useful.



Mass surveillance ©Getty - Leo Patrizi

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## LOSING TRUST IN POLITICAL ELITES

The 1960s-1970s saw massive social movements and political protests unfold in a number of countries. A growing distrust of political elites has gained strength over the past decade. It is fuelled by political scandals and corruption, economic and social crises (2008), mass media and social networks.

Dissatisfaction with political elites has spread and is expressed through protests and civil disobedience action, spreading to all countries worldwide (2019). The OECD reported in 2022 that only 41% of member country citizens have confidence in public authorities.<sup>32</sup> Globally, according to EDELMAN, trust in governments dropped 12 points from 2021 to 2022.<sup>33</sup>

This breakdown of confidence in public players could bring radical political parties to power, potentially triggering sweeping general upheaval and leading to further mass civil protests, as was the case globally in 2019.

Institutional trust in Morocco, though improving slightly since 2011, struggles to take root in the forums of representative democracy, according to IRES.<sup>34</sup> This crisis of confidence is compounded by rampant inflation, eroding citizens' purchasing power.

According to findings of the 2022 permanent household survey conducted by the High Commission for Planning, the Household Confidence Index has trended downwards since the second quarter of 2018, hitting its lowest level since the launch of the survey in 2008, in the fourth quarter of 2022.

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## POST-TRUTH

This describes a phenomenon whereby people are particularly likely to believe and propagate information that matches their own beliefs and prejudices, even if this information is inaccurate or misleading.

The roots of post-truth can be traced back to 2003 when the USA offered false evidence to justify its invasion of Iraq.<sup>35</sup> Similar events - high-impact actions removed from objective facts - proliferated from 2016 onwards, climaxing in 2021 with the breaching of the U.S. Capitol and many anti-vaccination campaigns.

This gap between reality and narrative, when it becomes a tool of governance, creates difficult to counter adverse effects, particularly in economic and environmental terms.<sup>36</sup>

Post-truth issues do not directly impact Morocco today. The phenomenon does, however, have an impact on a number of its strategic allies, including the USA and Europe, and could potentially affect Morocco's youth via social networks.

## RADICALIZATION OF POLITICS

Political radicalization\* is a reality in many countries, with the rise of political extremes on both right and left (e.g. in France, with the rise of the "Rassemblement National" and "Les Insoumis"), along with the surge of populist and nationalist movements (e.g. Trumpism in the USA).

This radicalization is likely to lead to populist decision-making, negatively impacting progress on global issues such as climate,<sup>37</sup> international stability, gender equity,<sup>38</sup> and respect for minorities,<sup>39</sup>...

Morocco side-stepped this wave of political radicalization because of its political system. But a few of its allies could be swept by it, with possible repercussions for relations with the Kingdom.

## WESTERN WITHDRAWAL

Western powers have gradually withdrawn from previous operating regions, such as Africa and the Middle East. The USA withdrawal from Afghanistan and France's withdrawal from the Sahel signal an end to the "Western leadership" era, and the emergence of new players projecting global influence, such as China, Russia and India.<sup>40</sup>

The West's withdrawal paves the way for major geopolitical upheavals, in the Middle East with the reconciliation of Iran and Saudi Arabia and the return of Syria to the Arab League, and in Africa with the proliferation of Russia's Wagner group mercenaries.

As a Western ally and strategic partner to a number of emerging powers, Morocco must take its place in this new geopolitical landscape.

## EXPONENTIALITY

### ARTIFICIAL INTELLIGENCE

Artificial Intelligence\* is a field of computer science that specializes in systems capable of imitating human intelligence. It aims to develop machines capable of learning, reasoning, perceiving and solving problems autonomously. Artificial Intelligence techniques include machine learning, computer vision, natural language processing and robotics.

Artificial Intelligence has developed steadily in terms of both research and applications since 1956.<sup>41</sup> Today, the Artificial Intelligence market is expanding exponentially: global AI spending stood at \$50 billion in 2020, and is poised to surpass \$185 billion in 2026.<sup>42</sup>

Artificial Intelligence-based solutions abound today across all sectors of activity, from finance and medicine to education, transport and industry, thus confirming its broad adoption as a new technological solution.

However, the latest notable development in Artificial Intelligence is the release of "ChatGPT" (Generative Artificial Intelligence) conversational agents to the general public, highlighting some of the challenges involved in developing this type of technology.

Beyond ethical, energy and security considerations,<sup>43</sup> the challenge now is to measure and anticipate the real impact of Artificial Intelligence on the job market. McKinsey Global Institute<sup>44</sup> estimates that some 400 to 800 million jobs will be threatened by automation and the adoption of Artificial Intelligence by 2030, not only in administrative, legal and support fields, but also in creative intellectual sectors such as journalism, design, innovation and even strategy.

Recognizing the importance of Artificial Intelligence, Morocco is implementing initiatives to promote the development of this field. Artificial Intelligence research centers, public-private partnerships and educational programs are emerging to foster research, training and youth involvement in the field. These successes deserve to be supported by the design and implementation of a national Artificial Intelligence strategy.

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## BIOTECHNOLOGY

Biotech\* combines biology and technology to develop products and techniques that improve our understanding of life, health, and the environment.

Biotech has grown significantly over the past 20 years, thanks to major advances including: the full sequencing of the human genome (2003), the CRISPR-Cas9 genome-editing tool (2012), gene therapy for specific hereditary diseases (such as spinal muscular atrophy), regenerative medicine (stem cells), ...

Current issues (ethics, sustainability, safety) underscore the need for a thoughtful, ethical, and regulated approach to biotech development and application, maximizing positive impacts while minimizing risks to society and the environment.

Biotech in Morocco is a growing discipline, focused primarily on health, agriculture, and the environment (Research, Development, and Innovation) - genetic disease diagnosis, disease-resistant crop development, biodiversity conservation, .... A regulatory framework to support the development of biotechnology-related activities is highly recommended.

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## BLOCKCHAIN

Blockchain<sup>\*45</sup> technology provides a secure and transparent digital ledger. It uses a decentralized network of interconnected computers to immutably record and verify transactions. Thanks to cryptography, it offers secure, traceable transactions without the need for a central authority.

Its practical use since 2009 (applied to a cryptocurrency) has introduced a new paradigm of data storage and management (security, transparency, trust, decentralization, reduction of intermediaries) which has opened the doors to numerous other applications in fields as varied as finance, logistics, health, energy, ...

Its disruptive potential is by no means done: blockchain is disrupting legacy business models (smart contracts, traceability, peer-to-peer), the use of trusted third parties (notary's office, for example), and generating innovative ecosystems (innovation, research, collaboration).

In the case of Africa, blockchain could transform land ownership by providing transparent and unassailable security for acquisition or transfer.

A few blockchain projects and collaborations are underway in Morocco, notably in the areas of finance and logistics. While blockchain in Morocco is still at an early stage of development, the level of interest and initiatives underway indicate the country does recognize the potential and is looking to explore blockchain applications to drive innovation, improve process efficiency and foster economic development.

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#### DATA CLOUDIFICATION

The idea of storing data in the cloud\* often obscures the fact that this data is actually physically stored in datacenters\*, a fast-growing business segment. These server farms are essential to the digitalization of our economy and society, storing, processing and distributing immense quantities of data.

Operating them, however, raises a set of major issues, not the least of which is high energy and space requirements, worrisome environmental impact (manufacturing, use and disposal), and respect to data security (combating cyber-attacks, ability to ensure continuous, reliable service).

The growing adoption of Artificial Intelligence, Big Data\*, the Internet of Things\* and Blockchain means datacenters will need 3 to 13% of the planet's electricity by 2030 (up from 1% in 2010).<sup>46</sup> This is no doubt why communications technology companies are the world's leading consumers of renewable energy (15 gigawatts in 2021)<sup>47</sup>.

Morocco has made significant efforts to attract investment in this area, and to develop its own data center infrastructure, e.g. Maroc Datacenter in Temara. Offering renewable energy and environmentally-friendly, energy-efficient cooling is certainly welcome.

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#### ELECTRIC VEHICLES

An electric vehicle\* draws motive power primarily from electricity stored in a large-capacity rechargeable battery, whatever the technical configuration (hybrid, 100% electric, hydrogen, ...).

Electric cars only really emerged in the early 2010s, with sales rising from 125,000 units worldwide in 2012 to 6.4 million in 2021.<sup>48</sup>



This exponential trend is set to persist in the years ahead, supported by technological advances and the drive to decarbonize mobility.<sup>49</sup>

The use of electric vehicles in Morocco is still at an embryonic stage, despite a recent but significant increase from 1,163 units in 2018 to 5,714 in 2021.<sup>50</sup> The Kingdom stands to gain from expanding the use and production of electric vehicles, thereby partially decarbonizing a transport sector that is a major emitter of greenhouse gases, reducing the country's heavy dependence on fossil fuels and joining the global production market for electric cars.

#### PHARMACEUTICAL SOVEREIGNTY

Pharmaceutical sovereignty\* is a country's ability to make autonomous decisions with regard to its pharmaceutical policy, production, distribution and access to medicine. It implies policies and measures that ensure a population's health needs are met sustainably and independently, without excessive dependence on pharmaceutical imports.

The vulnerability of heavily import-dependent countries became apparent as early as the oil crisis of the 1970s ("global supply chain disruption"). In turn, the AIDS epidemic (80s), the Ebola epidemic (2015) and the Covid-19 pandemic underlined the need to strengthen national pharmaceutical sovereignty and promote policies and initiatives that ensure equitable access for all to essential medicines (including antiretrovirals).

While emerging countries (India, Brazil, China, South Africa) have made significant strides, the vast majority of developing countries still struggle to develop national production capacities, strengthen pharmaceutical R&D, promote the production of generic medicines, consolidate national regulations and gain access to the necessary pharmaceutical knowledge and resources.

At the same time, aging populations, strong emerging markets growth, advances in gene and cell-based therapies, and rising health spending per household in many countries, all combine to fuel accelerated growth in the global pharmaceuticals market: global sales hit \$1,291 billion in 2021, up over 6.8% from 2020.<sup>51</sup> Pharmaceutical sovereignty is now a structural issue.

Morocco has taken several steps to strengthen its pharmaceutical sovereignty: promoting local production, developing R&D capacities, pharmaceutical regulation, regional and international cooperation, and equitable access to medicines. Drawing lessons from the Covid-19 pandemic, the Kingdom has embarked on the production of vaccines to cover its domestic needs and those of the African continent.

## PHOTOVOLTAIC SOLAR ENERGY

Photovoltaic\* solar energy is a renewable form of energy that converts sunlight into electricity using solar cells made from semiconductor materials such as silicon.

Space technologies were the first to adopt photovoltaic solar energy in the late 1950s.<sup>52</sup> It has since established itself as an essential energy solution, driven by growing environmental awareness and advances in research and development in this area.

A source of decarbonated energy (with no greenhouse gas emissions), its initial production costs have dropped 88% from 2010 to 2021<sup>53</sup>, while its efficiency rose from 13.8% in 2010 to 17.2% in 2021<sup>54</sup>, two determining factors for its widespread adoption.

With one of the world's greatest solar energy potentials,<sup>55</sup> 90% foreign energy dependency in 2020<sup>56</sup> and a domestic energy mix predominantly comprised of fossil fuels, Morocco is in a position to step up photovoltaic solar energy adoption at all levels, and nurture a sound green hydrogen\* sector. Clear legislation and incentives, for businesses, public authorities and private individuals alike, could encourage such an energy transition.

## SECURING SUPPLY CHAINS

The idea is to guarantee the availability and quality of raw materials, products and services, by reducing dependence on external suppliers and diversifying sources of supply.

Supply chain security has become a major concern in the areas of energy, information and communication technologies, health and food since the turn of the century, in the wake of the 2001 attacks (USA), the 2002 SARS epidemic, the 2006 bird flu epidemic and the 2020 Covid-19 epidemic. Natural disasters and cyber-attacks have also highlighted this vulnerability on a daily basis.

Supply chain security is now recognized as a crucial strategic issue to ensure business continuity, minimize disruption and protect the reputation and assets of organizations. There are still considerable challenges to be met to achieve security, notably in terms of regulation (standards), international cooperation, and developing new sustainable sources of supply.

Morocco is also committed to securing this supply (regulatory framework, logistics infrastructure, Exclusive Economic Zones, ...) so as to provide a secure regional supply territory to Europe and Africa. It is up to every Moroccan industrial operator to exercise the utmost vigilance in this area, and to take proactive steps to broaden supply chains.

## PLANETIZATION

### CIRCULAR ECONOMY

This economic model aims at minimizing waste and maximizing the reuse and recycling of resources.

The circular economy\* is gaining acceptance worldwide as a potential solution to environmental challenges such as the over-consumption of resources, pollution and climate change. A number of corporations, cities and countries (Netherlands, France, China, Finland) are adopting circular economy principles, with initiatives ranging from recycling and reuse to eco-design and the sharing economy.

The transition to a circular economy is however still in its infancy and faces a set of obstacles that need to be addressed through a profound rethink of production and consumption, significant investment in new technologies and infrastructure, and appropriate regulations and incentives.

A circular economy could alleviate a few of Morocco's environmental challenges, particularly waste management, energy consumption, and water scarcity. It also brings new economic opportunities, in recycling, renewable energy, and sustainable agriculture. The Kingdom, having already taken measures in this direction, notably with the national waste recovery program, should resolutely embark on a comprehensive circular economy policy.

### CLIMATE REFUGEES

Environmental migrants or climate displaced people are those forced to leave their homes due to sudden or gradual environmental changes (sea level rise, droughts, floods, hurricanes) that impact their lives and/or livelihoods.

From 2009 to 2018, nearly one person worldwide was displaced by climate - or weather-related events - every second, that is over 22.5 million people a year.<sup>57</sup> Hurricanes, floods and drought forced 7.4 million Africans to leave their homes in 2022.<sup>58</sup>

The plight of climate refugees is a growing global concern. The World Bank calculates<sup>59</sup> that some 216 million people in the developing world could be internally displaced by 2050 as a result of climate change (mainly in sub-Saharan Africa, South Asia and Latin America). Such hotbeds of internal climate migration could appear as early as 2030.

This surge in the number of climate refugees could lead to a humanitarian crisis (all the more so as, in the absence of an international legal definition of climate refugees, they do not enjoy the same protection as other refugees), conflicts over resources and geopolitical tensions.

Morocco is concerned in two ways: today, as a transit country for migrants, including climate refugees from sub-Saharan Africa bound for Europe; and tomorrow, as a country of internal displacement resulting from climatic effects (desertification, drought, rising sea levels). It therefore has a key role to play in managing this emergence and in finding sustainable solutions.

### COASTAL ARTIFICIALIZATION

Coastal artificialization\* refers to the transformation of natural coastal areas into spaces developed for housing, commerce, tourism or other human activities (construction of buildings, roads, harbors, dykes; modification of beaches, dunes and wetlands).

A rising trend worldwide, it is particularly noticeable in tourist areas, coastal towns and industrial zones, leading to biodiversity loss, beach erosion and increased vulnerability of coastal communities to climate change.

In light of these major environmental and human implications, it is critical to reconcile economic development with coastal preservation. This requires effective coastal management policies, careful planning and public awareness.

Morocco, with 3,500 kilometers of Atlantic and Mediterranean coastline, is directly exposed to this situation, which has already reshaped many sections of its coastline. The country has taken steps to manage its coastal zones, notably by creating protected areas and promoting sustainable tourism, but the destruction of natural habitats and coastal erosion continue.

### CRITICAL THRESHOLD FOR PLASTIC POLLUTION

The build-up of plastic substances in the environment has adverse effects on wildlife and humans. This plastics pollution is primarily caused by consumer waste, such as water bottles, plastic bags, food packaging, and fishing nets. Breaking down very slowly, plastic lingers in the environment for centuries, and plastic micro-particles are now detected in even the most remote parts of the planet as well as in human placentas.<sup>60</sup>

Plastic pollution is getting worse. Up until 2016, some 8 million metric tons of plastic ended up in the oceans every year, with devastating consequences for marine life: Should current trends persist, the weight of plastic in the oceans will exceed that of fish by 2050.<sup>61</sup> 9 to 12 million metric tons were dumped in 2021. This figure could reach 29 million metric tons by 2040.<sup>62</sup> Plastic production also contributes to climate change, through greenhouse gas emissions.

In 2016, Morocco took the bold step of banning single-use plastic bags. The problem however persists with other forms of plastic waste and marine plastic pollution. Efforts to manage and curb plastic pollution are all the more imperative as plastics and polymer imports could double by 2030,<sup>63</sup> with plastics now Morocco's chemical industry's second-largest processing sector.<sup>64</sup>

## GLOBAL FRESHWATER CRISIS

The global freshwater crisis reflects the growing shortage of safe, accessible drinking water worldwide.

Population growth, urbanization, high-intensity agriculture, industrialization, water pollution, waste and climate change are just some of the factors fuelling this crisis: freshwater resource utilization has grown nearly 1% per year over the past 40 years.<sup>65</sup> In 2020, 26% of the world's population (2 billion people) did not have access to safe drinking water and 46% (3.6 billion) did not have access to adequate sanitation.<sup>66</sup>

The UN World Water Development Report 2023 estimates that 2-3 billion people face water shortages for at least one month of the year. Sub-Saharan Africa, the Middle East, South Asia and portions of Latin America are hit the hardest.

The situation will likely worsen in the future, notably in cities: the number of people in urban areas facing water shortages worldwide is projected to rise to 1.7 to 2.4 billion in 2050,<sup>67</sup> from 933 million in 2020, as demand for water continues to grow in the face of dwindling supply.

Morocco, in a semi-arid region, is hard hit by the freshwater crisis, with worsening drought, groundwater abuse and a water management system that is slow to adapt to demand. Despite measures taken to better manage water resources (National Program for Drinking Water Supply and Irrigation),<sup>68</sup> the water crisis remains a major concern for the country.

## METROPOLIZATION

Metropolization\* is a process by which cities, particularly large metropolises, become major centers of population, economic activity, and power. This implies a growing concentration of resources, infrastructures, innovations, and opportunities in these urban areas, as well as supply and waste management issues.

A second wave of metropolization is underway (after that of the West) in developing countries, driven by the rapid urbanization of cities such as Lagos, Mumbai, Sao Paulo, and Jakarta. The number of global metropolises is set to rise from 33 in 2023 to 47 in 2050, with an additional 4 in Africa and 7 in Asia.<sup>69</sup>

A source of socio-economic inequality, both between cities and rural regions and within cities themselves (slums), metropolization also puts pressure on urban infrastructure and the environment, notably housing, transport, pollution and waste management. Hence the urgency for sustainable and inclusive management of the growth in these urban areas.

Casablanca, Morocco's major metropolis, not only draws large portions of the country's population, investment and economic activity, but also attracts foreign economic operators. This creates challenges for the city in terms of congestion, housing, public services, and quality of life. Other Moroccan cities, including Marrakech, have experienced metropolization. The Kingdom is therefore after solutions enabling it to manage the growth of its metropolises while ensuring equity and sustainability.

## CONCLUSION

Produced as part of IRES' Foresight Intelligence mission - that of keeping a close eye on national and international developments, with a view to preparing Morocco for tomorrow's world – Annual Survey Paper (ASP) 2023 provides an overview of key emerging trends likely to have an impact on Morocco's development course and global standing.

These emerging trends are best categorized along the five pillars of the IRES reading grid, as follows:

- **Human-centric:** erosion of human values, high degree of virtualization in the workplace, deteriorating mental health... all have repercussions on the way we live together.
- **Nature-centric:** accelerating progress toward planetary boundaries, particularly as regards global warming and biodiversity degradation, calls for the urgent reassessment of our relationship with nature.
- **Governance:** geostrategic reconfigurations heralding a new world order, a breakdown of trust in political elites across the globe, and a proliferation of news sources calling for greater vigilance against "fake news", require a fresh look at governance at both national and international levels.
- **Exponentiality:** rapid development of disruptive technologies (biotech, blockchain, artificial intelligence...) transforming the way we live, work, and travel. It is essential to optimize the benefits and control the risks of these technologies.
- **Planetization:** global water crisis, coastal artificialization, metropolization... all support promoting a circular economy and developing new environmentally-friendly business models.

In the face of uncertainty, the ASP aims to make a contribution, enabling decision-makers to connect present action and future thinking.

As showed by the Covid-19 pandemic, needs and assumptions are liable to quick and unpredictable change. Planning for the future requires a re-evaluation of current policies and regular monitoring of national and international conditions. With this in mind, IRES will be updating its Annual Survey Paper on an annual basis.

*"An emergence occurs whenever a degree of organization and integration of greater complexity appears in the Universe. The possible number of emergences is obviously indeterminate at present."*

Juignet Patrick, Philosopher, Publishing Director of Philosophie,  
"science et société"

## GLOSSARY

Term	Definition
<b>Artificial Intelligence</b>	<p>Artificial Intelligence (AI) is a process that imitates human intelligence using algorithms in a dynamic computing environment. Its aim is to give computers the ability to think and act like human beings.</p> <p>Source: Larousse Encyclopedia. " Intelligence artificielle ".  <a href="https://www.larousse.fr/encyclopedie/divers/intelligence_artificielle/187257">https://www.larousse.fr/encyclopedie/divers/intelligence_artificielle/187257</a>. Last consulted: 25-07-2023.</p>
<b>Big data</b>	<p>"Big Data" denotes data which, by virtue of its volume, velocity and variety, requires advanced technologies and analytical methods to process and extract value from it.</p> <p>Source: Bremme, Loïc, " Définition : Qu'est-ce que le Big Data ?". lebigdata.fr.  <a href="https://www.lebigdata.fr/definition-big-data">https://www.lebigdata.fr/definition-big-data</a>. Last consulted: 26-07-2023.</p>
<b>Biodiversity</b>	<p>The diversity of life present on planet Earth, in all its manifestations. It encompasses not only the number of species, but also genetic variations within each species and dynamic interactions between these life forms within complex ecosystems.</p> <p>Source: European Parliament. "Perte de la biodiversité : quelles en sont les causes et les conséquences ?". June 2021. <a href="https://www.europarl.europa.eu/news/fr/headlines/society/20200109STO69929/perde-de-la-biodiversite-queelles-en-sont-les-causes-et-les-consequences">https://www.europarl.europa.eu/news/fr/headlines/society/20200109STO69929/perde-de-la-biodiversite-queelles-en-sont-les-causes-et-les-consequences</a>. Last consulted: 26-07-2023</p>
<b>Bioresistance</b>	<p>The ability of a living organism to rebuild its natural immune defenses after antibiotic treatment. This notion can be broadened to other types of treatment, not necessarily for humans (antivirals, pesticides, insecticides, ...).</p> <p>Source: La langue française.  <a href="https://www.lalanguefrancaise.com/dictionnaire/definition/bioresistance">https://www.lalanguefrancaise.com/dictionnaire/definition/bioresistance</a> Last consulted: 26-07-2023</p>
<b>Biotechnology</b>	<p>A field encompassing all technologies and applications involving the use or modification of living materials for scientific research to further human knowledge, or for commercial purposes to develop a product or service.</p> <p>Source: "La biotechnologie, c'est quoi?". November 2020.  <a href="https://www.geo.fr/environnement/la-biotechnologie-cest-quoi-193500">https://www.geo.fr/environnement/la-biotechnologie-cest-quoi-193500</a> Last consulted: 26-07-2023</p>



<b>Blockchain</b>	<p>Transparent, secure information transmission and storage technology that operates without a central control body. It constitutes a database holding the history of all exchanges among users since its creation.</p> <p>Source: <i>Commission Nationale de l'Information et des Libertés (France)</i>. "Blockchain". <a href="https://www.cnil.fr/fr/definition/blockchain">https://www.cnil.fr/fr/definition/blockchain</a>. Last consulted: 25-07-2023</p>
<b>Circular economy</b>	<p>The circular economy strives to ensure sustainable production by minimizing resource consumption, waste, and waste generation. It relies on building virtuous cycles of reuse and recovery, thus promoting optimal resource use.</p> <p>Source: <i>Institut National de l'Economie Circulaire (France)</i>. "L'économie circulaire : Une économie créatrice de valeur sociale, économique et environnementale". <a href="https://institut-economie-circulaire.fr/economie-circulaire/">https://institut-economie-circulaire.fr/economie-circulaire/</a>. Last consulted: 26-07-2023.</p>
<b>Climate refugees</b>	<p>People temporarily or permanently displaced from their homes as a result of environmental degradation caused by climate change, severely disrupting living conditions and quality of life.</p> <p>Source: <i>Oxfam</i>. "Towards a growing increase in the number of climate refugees". September 2022. <a href="https://www.oxfamfrance.org/migrations/vers-une-augmentation-croissante-du-nombre-de-refugies-climatiques/">https://www.oxfamfrance.org/migrations/vers-une-augmentation-croissante-du-nombre-de-refugies-climatiques/</a>. Last consulted: 26-07-2023</p>
<b>Cloud</b>	<p>Data repository where computer data is stored and accessed remotely via a communications network, usually the Internet.</p> <p>Source: <i>Dabi-Schwebel, Gabriel</i>. "Cloud. August 2014. <a href="https://www.1min30.com/dictionnaire-du-web/cloud">https://www.1min30.com/dictionnaire-du-web/cloud</a>. Last consulted: 25-07-2023.</p>
<b>Cloudification</b>	<p>Cloudification is the migration of applications, data storage and computing cycles to the cloud to harness the potential of cloud computing.</p> <p>Source: <i>IT@Cornell</i>. "Cloudification". <a href="https://it.cornell.edu/cornell-cloud">https://it.cornell.edu/cornell-cloud</a>. Last consulted: 25-07-2023.</p>
<b>Coastal artificialization</b>	<p>The process of transforming natural coastal areas into artificial spaces (buildings, infrastructure, industrial zones, ...), often as part of urban, industrial, commercial or tourist development, leading to the degradation of natural resources.</p> <p>Source: <i>Milieu Marin France</i>. "L'artificialisation du littoral". April 2020. <a href="https://www.milieumarinfrance.fr/Nos-rubriques/Activites-et-usages/Artificialisation-du-littoral">https://www.milieumarinfrance.fr/Nos-rubriques/Activites-et-usages/Artificialisation-du-littoral</a>. Last consulted: 25-07-2023.</p>

<b>Datacenter</b>	<p>A physical location and service housing IT equipment including servers, routers, switches, hard disks, ... These are used to store and distribute data, via an internal network or over the Internet.</p> <p>Source: Futura. "Data center: what is it?". January 2020. <a href="https://www.futura-sciences.com/tech/definitions/informatique-data-center-15675/">https://www.futura-sciences.com/tech/definitions/informatique-data-center-15675/</a>. Last consulted: 25-07-2023.</p>
<b>Digitization</b>	<p>The process of converting a task, profession, object, or tool into computer code with the aim of improving the performance of an organization, company, or administrative body.</p> <p>Source: Bynder. "Definition: Digitization". <a href="https://www.bynder.com/fr/glossaire/digitalisation/">https://www.bynder.com/fr/glossaire/digitalisation/</a>. Last consulted: 26-07-2023.</p>
<b>Electrical Vehicle</b>	<p>Motor vehicle that runs partially or exclusively on electric power, which is stored in a rechargeable battery, unlike cars with internal combustion engines, which use gasoline or diesel to propel the vehicle.</p> <p>Source: Mauguit, Quentin. "Electric cars: what are they?". Futura. October 2013. <a href="https://www.futura-sciences.com/tech/definitions/voiture-electrique-voiture-electrique-13758/">https://www.futura-sciences.com/tech/definitions/voiture-electrique-voiture-electrique-13758/</a>. Last consulted: 25-07-2023.</p>
<b>Emerging trend</b>	<p>An emerging phenomenon that produces an inflection in a major trend, a discontinuity, or the birth of a new trend. Often linked to the emergence of new players, a change in role of a player in the system, new modes of behavior or sociability, ...</p> <p>Source: Futuribles. "Les étapes de la démarche de prospective". <a href="https://www.futuribles.com/la-prospective/etapes-de-la-demarche/analyse/">https://www.futuribles.com/la-prospective/etapes-de-la-demarche/analyse/</a>. Last consulted: 26-07-2023.</p>
<b>Food waste</b>	<p>The concept refers to a deterioration in the quantity or quality of food as a result of decisions and actions taken by retailers, food service providers, or consumers.</p> <p>Source: FAO. <i>The State of Food and Agriculture 2019. Moving forward on food loss and waste reduction</i>. Rome. 2019. <a href="https://www.fao.org/3/ca6030en/ca6030en.pdf">https://www.fao.org/3/ca6030en/ca6030en.pdf</a>.</p>
<b>Green Hydrogen</b>	<p>Designates Hydrogen produced using renewable energy sources, i.e. electrolysis, which breaks down water molecules (H<sub>2</sub>O) with an electric current to obtain dioxygen (O<sub>2</sub>) and dihydrogen (H<sub>2</sub>).</p> <p>Source: Orygeen. "What is Green Hydrogen?". <a href="https://www.orygeen.eu/docs-actus/glossaire/hydrogene-vert/">https://www.orygeen.eu/docs-actus/glossaire/hydrogene-vert/</a>. Last consulted: 25-07-2023.</p>

<b>Human values</b>	<p>Set of values (respect, acceptance, openness, mutual aid, benevolence, empathy, ...) that help forge links between people, touching upon each other's humanity, thus enabling harmony in society.</p> <p>Source: <i>Graines de Paix</i>. "Quelles valeurs humaines ?". 2016.  <a href="https://www.grainesdepaix.org/fr/ressources/sinspirer/concepts-de-paix/Facteurs-de-paix-3-idees-fortes/les-valeurs-humaines/quelles-valeurs-humaines">https://www.grainesdepaix.org/fr/ressources/sinspirer/concepts-de-paix/Facteurs-de-paix-3-idees-fortes/les-valeurs-humaines/quelles-valeurs-humaines</a> Last consulted: 26-07-2023.</p>
<b>Influencer</b>	<p>Social media content creator who has a strong following and who shares his or her opinions, activities, and consumer habits, thereby influencing his or her followers.</p> <p>Source: <i>E-marketing.fr</i>. "Influenceurs : définition, objectifs et salaire ".  <a href="https://www.e-marketing.fr/Definitions-Glossaire/Influenceurs-304209.htm">https://www.e-marketing.fr/Definitions-Glossaire/Influenceurs-304209.htm</a>. Last consulted: 26-07-2023.</p>
<b>Internet of Objects</b>	<p>Refers to connecting physical objects to the Internet (home automation, medical equipment, industrial machinery, ...), as well as the network that links these objects together. It enables data to be transferred over a network without human-to-human or human-to-machine interaction.</p> <p>Source: <i>OvHCloud</i>. "Qu'est-ce que l'Internet des objets (IOT)?".  <a href="https://www.ovhcloud.com/fr-ma/learn/what-is-iot/">https://www.ovhcloud.com/fr-ma/learn/what-is-iot/</a> Last consulted: 26-07-2023.</p>
<b>Mass surveillance</b>	<p>Authorities closely monitor entire populations, notably by tracking activity on electronic communication devices.</p> <p>Source: <i>Butler, Israel</i>. "#MeAndMyRights: mass surveillance, what is it?". <i>Civil Liberties Union for Europe</i>. October 2017.  <a href="https://www.liberties.eu/fr/stories/meandmyrights-what-is-mass-surveillance/13266">https://www.liberties.eu/fr/stories/meandmyrights-what-is-mass-surveillance/13266</a>. Last consulted: 26-07-2023.</p>
<b>Mental Health</b>	<p>State of psychological and cognitive well-being that enables optimal management of various aspects of life. It is often altered by a complex set of individual, social and structural pressures and vulnerabilities".</p> <p>Source: <i>World Health Organization</i>. "Mental health: strengthening our action". June 2022.  <a href="https://www.who.int/fr/news-room/fact-sheets/detail/mental-health-strengthening-our-response">https://www.who.int/fr/news-room/fact-sheets/detail/mental-health-strengthening-our-response</a>. Last Consulted: 25-07-2023.</p>
<b>Metropolization</b>	<p>The growing concentration of populations, economic activities and strategic functions in large urban agglomerations, spurred by a variety of factors, including economies of scale and agglomeration, comparative advantages, network accessibility needs, ...</p> <p>Source: <i>Géoconfluences</i>. "Métropolisation". <a href="https://geoconfluences.ens-lyon.fr/glossaire/metropolisation">https://geoconfluences.ens-lyon.fr/glossaire/metropolisation</a>. January 2023.  Last consulted: 25-07-2023.</p>

<b>News source</b>	<p>Origin or reference from which data, facts, knowledge, or details can be obtained on a specific subject. There are three main categories: primary sources, secondary sources, and tertiary sources.</p> <p>Source: <i>Université du Québec à Montréal</i>. "Catégories des sources d'information". <a href="https://infosphere.uqam.ca/preparer-sa-recherche/identifier-type-travail/categories-sources-dinformation/">https://infosphere.uqam.ca/preparer-sa-recherche/identifier-type-travail/categories-sources-dinformation/</a> Last consulted: 25-07-2023.</p>
<b>Overconsumption / Overutilization</b>	<p>Consumption or utilization that outstrips renewable resources, leading to the risk of shortage.</p> <p>Source: <i>La langue française</i>. "Surconsommation". <a href="https://www.lalanguefrancaise.com/dictionnaire/definition/surconsommation">https://www.lalanguefrancaise.com/dictionnaire/definition/surconsommation</a>. Last consulted: 25-07-2023.</p>
<b>Pharmaceutical sovereignty</b>	<p>A country's or group of countries' ability to have complete control over its pharmaceutical policies, drug production, and supply, and its capacity to meet the health needs of its population in terms of essential medicines.</p> <p>Source: <i>African Development Bank</i>. "Annual Meetings 2023: Africa's pharmaceutical sovereignty on the agenda for discussion". May 2023. <a href="https://www.afdb.org/fr/news-and-events/assemblees-annuelles-2023-la-souverainete-pharmaceutique-de-lafrique-lordre-du-jour-des-discussions-61327">https://www.afdb.org/fr/news-and-events/assemblees-annuelles-2023-la-souverainete-pharmaceutique-de-lafrique-lordre-du-jour-des-discussions-61327</a>. Last consulted: 26-07-2023.</p>
<b>Photovoltaic solar energy</b>	<p>Photovoltaic solar energy Photovoltaic solar energy converts solar energy into electricity using solar panels made up of photovoltaic cells. Under the effect of solar radiation, these cells generate an electric current, which can then be fed back into the power grid.</p> <p>Source: <i>EDF Energie</i>. "Energie solaire qu'est-ce que c'est ? Et comment l'exploiter ?". August 2022. <a href="https://www.edfenr.com/guide-solaire/energie-solaire/">https://www.edfenr.com/guide-solaire/energie-solaire/</a>. Last consulted: 25-07-2023.</p>
<b>Planetary boundaries</b>	<p>These nine limits outline the safe development space for humanity with respect to the Earth system, and are associated with the planet's sub-systems or biophysical processes.</p> <p>Source: <i>Rockström, J., Steffen, W., Noone, K. et al.</i> "A safe operating space for humanity." <i>Nature</i> 461, 2009: 472-475. <a href="https://doi.org/10.1038/461472a">https://doi.org/10.1038/461472a</a></p>
<b>Post-truth</b>	<p>Refers to circumstances in which objective facts carry less weight in shaping public opinion than appeal to emotion.</p> <p>Source: <i>Oxford Languages</i>. "Word of the Year 2016" <a href="https://languages.oup.com/word-of-the-year/2016/">https://languages.oup.com/word-of-the-year/2016/</a>. Last consulted: 25-07-2023.</p>

<b>Radicalization</b>	<p>The process by which an individual or group gradually adopts extreme positions or ideologies that are at odds with the status quo and challenge conventional thinking.</p> <p>Source: <i>Public Safety Canada. "Stratégie nationale de lutte contre la radicalisation menant à la violence" July 2022.</i>  <a href="https://www.securitepublique.gc.ca/cnt/rsrscs/pblctns/ntnl-strtg-cntrng-rdclztn-vlnc/index-fr.aspx">https://www.securitepublique.gc.ca/cnt/rsrscs/pblctns/ntnl-strtg-cntrng-rdclztn-vlnc/index-fr.aspx</a>. Last consulted: 26-07-2023.</p>
<b>Sea level rise</b>	<p>This gradual rise in average sea levels, primarily attributable to seawater thermal expansion and land ice thaws, has a significant impact on coastal areas (erosion, flooding, disruption of coastal ecosystems, and displacement of human communities).</p> <p>Source: <i>Lindsey Rebecca. "Climate Change: Global Sea Level. NOAA. April 2022</i>  <a href="https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level">https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level</a>. Last consulted: 26-07-2023.</p>
<b>Social network</b>	<p>IT platform (websites or mobile applications) that enables users to communicate, network, track other users' activities and interact in real-time.</p> <p>Source: <i>Solocal. "C'est quoi les réseaux sociaux?". April 2020.</i>  <a href="https://www.solocal.com/ressources/articles/definition-reseaux-sociaux">https://www.solocal.com/ressources/articles/definition-reseaux-sociaux</a> Last consulted: 25-07-2023.</p>
<b>Soil fertility</b>	<p>A soil's aptitude to provide a favorable environment for plant growth and productivity and ecosystem services over time, by supplying the nutrients, water, oxygen, and physico-chemical conditions needed to support crop growth.</p> <p>Source: <i>Union des Industries de la Fertilisation (France). "Fertilité des sols".</i>  <a href="https://fertilisation-edu.fr/enjeux-de-la-fertilisation/fertilite-des-sols.html">https://fertilisation-edu.fr/enjeux-de-la-fertilisation/fertilite-des-sols.html</a>. Last consulted: 25-07-2023.</p>
<b>Supply chains</b>	<p>A supply chain is a network that brings together a multitude of inputs (raw materials procurement, product development, parts assembly, product testing, shipping) to provide goods for final consumption.</p> <p>Source: <i>Diego A. Cerdeiro, Niels-Jakob H. Hansen. "Tensions in supply chains". International Monetary Fund. June 2022.</i>  <a href="https://www.imf.org/fr/Publications/fandd/issues/2022/06/the-stretch-of-supply-chains-B2B">https://www.imf.org/fr/Publications/fandd/issues/2022/06/the-stretch-of-supply-chains-B2B</a>. Last consulted: 25-07-2023.</p>

## ACRONYMS

<b>FAO</b>	Food and Agriculture Organization
<b>GPS</b>	Global Positioning System
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>NGO</b>	Non-Governmental Organization
<b>OECD</b>	Organization for Economic Co-operation and Development
<b>R&amp;D</b>	Research and Development
<b>UN</b>	United Nations
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>WHO</b>	World Health Organization

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