

SUBTERRANEAN SUNSICK BLUES

IN URBAN DEVELOPMENT, DOWN IS THE NEW UP. With traffic, heat-island effects, and ozone depletion making outdoor living ever less desirable (even as urbanization continues to accelerate rapidly), cities look to subterranean development as a new frontier. “Earthscrapers” and “suburbanization” are at the top of the planning agenda for numerous global cities with appropriate geological conditions. This type of development is extremely lucrative, especially for very high-density cities with nowhere to grow but down. Earthscraping brings new residential and office-space capacity to already dense urban centers, along with reduced costs for energy, air conditioning, heating, and policing. Many herald the downward movement as an urban planning success, adding density to cities and creating vibrant new centers of commerce and entertainment. However, critics decry it as a regional planning failure. Homelessness and poverty are still pressing problems in all major cities with “subturbs.” Many point out that for the exorbitant cost of these works, entire satellite cities connected by transit hubs to the urban core could be a more efficient and humane use of development funds. Proponents counter that satellite cities and urban cores inevitably lead to suburban sprawl, precisely the problem that suburbanization is meant to fix.

- Artificial light shafts take advantage of new developments in fiber-optic technology. Seasonal affect disorder, however, is still on the rise for underground residents and workers.
- Advances in excavation technology create entire underground shadow cities, with real estate speculation in major flux as specific underground geological characteristics become highly desirable. Former quarries and mines are sites of new underground metropolises and architectural experimentation.
- Net-zero skyscrapers dig deep into rock and use the underground material in the fabrication of the buildings above ground. On-site, large-scale 3D printing transforms construction.
- Strong control over usable space, usually accompanied by ubiquitous monitoring (for both law enforcement and early detection of fires, air problems, and other dangers) make policing subturbs relatively simple and low-cost. Concerns about privacy are trumped by the need for safety.
- Because existing underground tunnels and abandoned mines are already occupied by large squatter settlements, subterranean development comes face to face with some of the same urban renewal problems as communities above ground.
- Garbage collection and sewage are particularly costly; many developers negotiate for rights to pump sewage into evacuated aquifers, creating city-block-wide septic tanks underground. Others seek radical methods of recycling and reuse, with the goal of a completely zero-footprint development.

- **Housing preferences** undergo a rapid and radical change to accommodate urban density and climate risks.
- **People around the world** abandon the “romance of the automobile.”
- **Cradle-to-cradle** regulations and technologies change the incentives for new building.
- **Multiple climate and energy** crises converge.
- **Digital technology** creates above-ground experiences below ground.

LINKS TO FORECASTS:

■ **HYPER-URBANIZATION** accelerates the need for increased housing density in central locations without tearing down existing historic and legacy architecture.

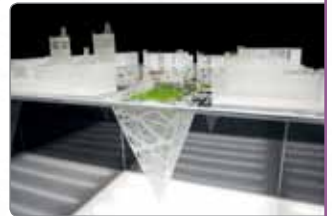
■ **DEINDUSTRIALIZATION** takes advantage of “blank slate” spaces to create new energy-saving and energy-generating structures.

■ **DEMATERIALIZATION** supports lightweight lifestyles and cradle-to-cradle practices.

SIGNALS

Mexico City considers 65-story-deep earthscraper

BNKR Arquitectura, a Mexican architecture firm, is proposing to build a 65-story earthscraper from glass and steel directly below the central plaza of Mexico City. The surrounding area has height restrictions of eight stories and is filled with historic architecture that will never be demolished. However, in such a central location, real estate is so highly valued that the \$800 million structure is considered by some to be commercially viable.



BNKR Arquitectura

Helsinki develops underground master plan

Already boasting a massive underground infrastructure of more than 200 kilometers of tunnels, the city of Helsinki is in the process of developing the most complex and ambitious underground master plan of any city in the world. Helsinki currently has underground housing, churches, gyms, hockey rinks, running tracks, coal storage, shopping malls, and a swimming center with facilities for more than 1,000 people. The master plan is essential to design and schedule new infrastructure in a logical fashion.



tunneltalk.com



getunderground.fi

Underground shopping malls proliferate in Singapore

Driven indoors by the heat, many Singaporeans have the option to make their daily commute without ever leaving an air-conditioned environment. Underground shopping malls like the new Marina Bay Link Mall are more than just shopping environments—they also provide important pedestrian thoroughfares that connect dozens of commercial and residential high-rise buildings to subways, parking lots, and street-level exits. The subway system itself also features numerous retail outlets throughout the city.

marina bay
LINK

marina baylink.com



expatbostonians.files.wordpress.com

AFTER A DECADE OF EFFORTS TO REV UP ALTERNATIVE ENERGY TECHNOLOGIES

and develop more efficient cars, appliances, homes, and office buildings, the winner is a surprise: fossil fuel. In the search for solutions to both climate and energy problems, carbon capture and sequestration have emerged as the heroic technologies. Methods of carbon capture at the source of emission spread quickly, but the real breakthroughs are the processes for “air capture”—pulling CO₂ directly out of the atmosphere. These technologies include enhanced weathering (speeding up the natural trapping of CO₂ in soil), synthetic air capture (essentially artificial trees), and phytosequestration (engineering faster, more efficient uptake of carbon in plants), among others. Together, they have closed waste loops and created virtuous cycles for the familiar fuel sources. At the same time, breakthroughs in energy use efficiency have started to reduce demand, especially in up-and-coming developing nations. Gas, coal, and petroleum thus remain the foundation fuels, with research and development of non-carbon energy technologies pushed to the side. At the same time, the discovery of substantial new fossil fuel reserves under the Arctic (now ice-free in the summer) has turned the “peak” in peak oil into a plateau that promises to sustain a growth economy through much of the coming century.

- Overall carbon in the atmosphere has dropped dramatically even though overall use of fossil fuel has never been higher, on track to achieve a CO₂ level of 350 ppm in 2050—an ideal goal once thought unrealistic.
- Efficiency-based conservation—featuring incremental improvements in existing appliances and infrastructures—allows continued lifestyle improvements for people around the world.
- Attempts to lock down critical resources lead to conflicts at many scales, from displaced individuals to criminal control of some resources, from corporate wars to large-scale geopolitical strife between have and have-not nations.
- Competition for funding among alternative energy sources (as well as competition between centralized and decentralized versions of them) slows the development and adoption of new technologies. It also produces a public backlash against energy innovation.
- Although the climate crisis has been averted, other risks associated with fossil fuels remain: conflict in petroleum-rich regions, non-carbon pollution effects (such as acid rain), and negative health and well-being impacts of cars and the culture they create. In an ironic twist, some environmentalists respond by vandalizing the sequestration technologies.
- Investments in biofuels and synthetic petroleum are diverted to non-energy uses of many petroleum products, with much lower returns than originally anticipated.

- **Carbon capture** works better than expected, especially cost-effective air capture.
- **New accessible reserves** discovered.
- **Clean coal** really is clean.
- **Moderate conservation** beats clean technologies.
- **Dissent about climate change** fades.

LINKS TO FORECASTS:

■ **DEINDUSTRIALIZATION** is slow as carbon capture and efficiency technologies extend the viability of the incumbent industrial status quo of companies, policies, and culture.

■ **DEMATERIALIZATION** radically boosts energy efficiency, which is as important as carbon capture in reducing atmospheric CO₂.

■ **BIOMOLECULARIZATION** drives a deeper understanding of photosynthesis, allowing for a significant increase in the carbon uptake efficiency of plants and the introduction of artificial photosynthesis into non-living materials.

SIGNALS

Cutting-edge technology captures carbon directly from the air

Research at the Lenfest Center for Sustainable Energy at Columbia University is seeking ways to pull CO₂ out of the ambient atmosphere. Preliminary designs include a scrubber, deployable by the millions around the world, that can extract one ton of carbon per day, as well as a carbon-absorbent resin that can be used as an artificial tree.



technologyreview.com

100 mpg vehicle created for the Automotive X-Prize contest

The Automotive X-Prize awarded \$5 million to the first team able to build a production-ready mainstream (4-seater) vehicle that could get over 100 miles per gallon equivalent. The entries included everything from fully electric to natural gas to diesel-electric hybrids, but the winner was a super-efficient internal combustion engine burning a gasoline-ethanol mix.

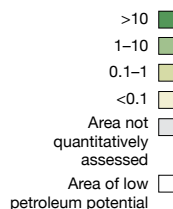


edison2.com

Billions of barrels of crude oil may lie undiscovered under the Arctic

The Circum-Arctic Resource Appraisal, conducted in 2009, suggests that the Arctic region contains between 44 and 157 billion barrels of as-yet undiscovered, recoverable oil reserves. (For context, global annual crude oil consumption stands at approximately 31 billion barrels.)

Undiscovered Oil (barrels in billions)



iosc.org

THROUGHOUT THE DECADE, THE EFFECTS OF ANTHROPOGENIC GLOBAL WARMING CONTINUE TO EXCEED THE WORST ESTIMATES OF IPCC

MODELS. By the end of the decade, even the staunchest “climate skeptic” can’t deny the impact of greenhouse gas overload, as a relentless sequence of global warming disasters occur around the world. Unfortunately, the ability of national governments to take direct action remains limited by finances and political distractions. Even with hundreds of thousands of people at most protests—and over a million people at a few—global demonstrations can’t budge world leaders. Into this vacuum of leadership comes a coalition of cities on the environmental cutting edge, calling for a global referendum on climate responses, and offering an alternative global governance structure to focus on global warming. Large capitals like New York, Berlin, and Shanghai provide the political weight, while smaller cities, such as Portland, Bangalore, and Curitiba, provide the innovation. Over 2.5 billion people vote in the global referendum (conducted primarily by mobile phone), and more than a billion non-voters express a clear opinion via websites and social media. The vast majority demand immediate action to cut carbon emissions and focus on climate adaptation. By the early 2020s, a new Confederation of Sustainable Cities has taken on a leadership role far greater than could have been anticipated, pressing their advantage in successive global referenda to begin building a new model of global governance.

- Governments go through the process of dismissal, ridicule, outrage, and acceptance of the Confederation at a fast pace, as massive storms, heat waves, and partial loss of the Greenland ice sheet lead to economic, environmental, and social conditions many describe as “worse than the aftermath of World War II.”
- In some countries, governments have resisted the global confederation, triggering popular uprisings. At least three revolutions can be traced to the movement.
- The Confederation of Sustainable Cities expressly limits itself to climate adaptation. But the interdependence of environmental, economic, technological, and social issues gives the Confederation a much broader mandate for global oversight.
- A number of big cities hold important positions in the Confederation, but the vast majority of participating members are small cities with populations of 100,000 people or fewer. With the advantage of fewer people and smaller bureaucracies, they are able to reinvent themselves more swiftly than “legacy cities.”
- The technical demands of the global referendum push the development of both strong privacy and strong transparency tools, which, in turn, enable a transformation of social media as well as government data.
- Cities unable or unwilling to meet Confederation guidelines find themselves bleeding people and businesses as the population flocks to more responsive locations.

- **Rapid climate disruption** remains a low government priority.
- **Tools for reliable worldwide voting** evolve and are adopted quickly.
- **The loss of confidence** in national governments leads to a willingness to trust “translocal” urban governments.
- **National governments** cede some sovereignty in the name of climate adaptation.
- **Citizens reject the “free rider” option**, where lagging cities let the leading cities make the big changes.

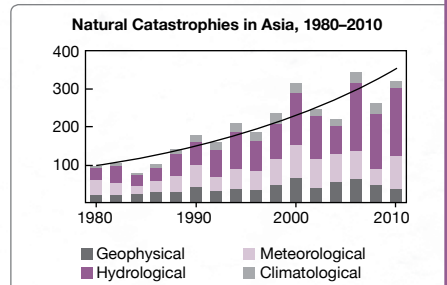
LINKS TO FORECASTS:

- **HYPER-URBANIZATION** heightens the risk of climate disasters while creating strong collective needs.
- **SOCIAL PRODUCTION** builds an infrastructure of participation for engaged citizens.
- **INFORMATION INTENSIFICATION** provides tools to improve understanding of complex global issues and galvanize citizen response.

SIGNALS

Climate-related disasters are more frequent

While climate-related disasters are accelerating around the world, Asia has seen the fastest increase in the frequency of disasters between 1980 and 2010. Africa has experienced a slower increase in events but at a higher cost (40% of global losses). The total number of people affected by natural disasters (including geophysical as well as climatological) has doubled over the past decade.



Vote World Parliament seeks to create a global referendum

The Canadian nonprofit Vote World Parliament is sponsoring a global referendum on creating a worldwide democracy to address major global problems. Starting in 2011, it provided an online ballot system for people around the world to vote for or against the creation of a directly elected, representative, transparent, and democratic world parliament that is authorized to legislate on global issues. As of the end of 2011, 95.4% of the 22,000 voters were in favor of the initiative.



voteworldparliament.org

Cities unite to address global warming issues

C40 Cities is a climate leadership group of cities committed to local actions that address climate change globally. The steering committee includes Berlin, Hong Kong, Jakarta, Johannesburg, Los Angeles, London, New York City, São Paulo, Seoul, and Tokyo. The field staff brings together city governments and technical experts across program areas that range from financing of sustainable infrastructures to design for resilience.



live.c40cities.org

IN A WORLD OF QUANTUM GROWTH OF INFORMATION AND DECLINING WAGE JOBS, students of all ages—from primary school to university—are dropping out of traditional educational institutions. While some claim that unauthorized “education bots” are socializing students away from conventional education, others argue that the online bots represent cutting-edge strategies for learning and human development. Based on the social bots from a decade earlier, education bots facilitate learning communities tailored to students’ individual social profiles, curating a wide range of open-source and proprietary digital curricula in game-like environments. Classes are a mix of augmented reality, contextual learning, hands-on DIY construction or experimentation, and video gaming. Bots incentivize learning through both in-game and real-world rewards: often free hardware and software are awarded to students who reach their personalized goals. As students progress through their education by “leveling up,” they are first in line for highly sought-after employment in the coalitions of human ecosystem and nextech communities that are springing up in the periphery of global megacities.

- At the forefront of bot-mediated education is a loose-knit coalition of leaders from forward-thinking tech companies. While they provide funding and infrastructure for the projects, groups of highly motivated ex-students and hackers help build social bots and education plans. As students begin to participate, they create a feedback loop to design new kinds of bots and lesson plans of their own.
 - Lesson plans are largely self-directed, but social bots not only steer students toward communities of compatible learners; they also provide strong incentives to learn skills that are most valuable to various nextech communities—including sustainable urban farming, organic photovoltaics, nanotech research, and matter replication.
 - Students who participate in bot-mediated education, on average, are generating more personal income than students who graduate with traditional degrees.
- In the United States, students in the traditional education system are looking at a drastic decrease in test scores. At this rate, the country will be ranked globally in the bottom 10th percentile in literacy and applied sciences by 2025.
 - Policy makers argue that bot-mediated education has created a brain drain from the classroom and it should be made illegal, while teachers argue that they need more funding for updated digital textbooks and innovation-focused tools.
 - A small faction of educators break away from teachers’ unions and publicly endorse bot-mediated education as a viable solution to the education crisis. Many of these educators secure funding for their own projects through nextech communities.

- **Special-purpose social bots** rapidly gain acceptance as tools of social architecture.
- **A broad-based movement** to dismantle traditional educational institutions gains momentum.
- **Immersive games** become preferred platforms for incentivizing and certifying educational achievements.
- **Free and open courseware** are widely seen as superior to traditional classroom curricula.

LINKS TO FORECASTS:

■ **DEMATERIALIZATION** shifts the focus away from educational materials for the classroom to cloud-based educational services.

■ **SOCIAL PRODUCTION** creates a culture of mutual instruction and shared materials for individual value creation.

■ **INFORMATION INTENSIFICATION** fuels rapid experimentation in ways to navigate complex information ecologies and expand individual cognitive capacity.

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Video lectures provide free, world-class education

Khan Academy describes its mission as providing “a free world-class education to anyone anywhere.” Not only does it provide more than 2,600 video courses and 200 exercises, it also builds a learning scaffold to support learners of all ages with an interactive knowledge map and individual, student-visible reports of their achievements. They currently serve 3.5 million new students per month.



khanacademy.org

Foundation pays young people to drop out of school and innovate

The Thiel Foundation wants to radically alter the paths to learning, scientific discovery, research, and entrepreneurial innovation. Each year, the foundation selects 20 bright students under the age of 20 and pays them \$100,000 to drop out of college and start their own businesses. The foundation also supports an alternative funding stream for breakthrough science and technology, called Breakout Labs.



thielfellowship.org

Pacific Social deploys bots to shape social communities

The Pacific Social Architecting Corporation is developing social bots—swarms of automated, intelligent, virtual identities—to shape social groupings and communities on platforms such as Twitter and Facebook. The bots, which appear as human personalities on social platforms, are typically tasked with amassing followers and also with encouraging connections among specific groups of online users. In a recent experiment on Twitter, one social bot produced a 355% connection rate among the target group.



pacsocial.com

GLOBAL UNEMPLOYMENT REACHES AN ALL-TIME HIGH—more than two-thirds of the global workforce is out of work. Nations around the world suffer repeated crises of central bank default and out-of-control inflation. Unemployment and welfare systems collapse as the buckling of governments at all levels undermines any remaining commitment to a “social safety net.” Without the necessary resources to enforce laws, governments stand by helplessly as overt graft and corruption become the global norm for doing business. All major corporations—from supermarkets to banks and even farms—have their own private security arms that protect their business operations. As often as not, these security forces share intelligence, resources, and strategies with transnational crime syndicates. These syndicates take advantage of their “connected” status to run complex networks of trafficking in everything from guns and drugs to food, luxury goods, and counterfeit electronics. Meanwhile, the great majority of the world’s employed people work on an informal basis, without paying taxes and without access to any type of benefits. Few make a strong distinction between legitimate employment and illicit income-generating activities. While official economic growth numbers have been in decline for over a decade, many speculate that the feral economy is stable or even growing.

- *Would you like that with or without a receipt?* The refrain of service providers in black-market laden countries goes global. As far as governments are concerned, nearly all transactions are done on a “need to know” basis.
- Alternative currencies such as Bitcoin and other forms of peer-to-peer (P2P) financial exchanges that don’t rely on central banks are popular for all forms of major transactions. These currencies prove more stable, reliable, and safe than traditional currencies in many cases.
- Violence becomes a common response to public displays of wealth. Designer jewelry, cutting-edge electronics, and luxury cars are all seen as invitations to thieves, and are increasingly rare on the streets of cities worldwide.
- Countries like Switzerland, Monaco, and Mauritius are known not just for their tax shelters, but also for their friendliness to private security industries. Business and luxury become synonymous with advanced weaponry, continuous surveillance, and even paranoia.
- Private missile defense shields are erected over the homes and business headquarters of billionaires and their multinational conglomerates to protect them from belligerent competitors as well as the “disgruntled masses.”
- While the feral economy plays out most obviously in feral cities, it thrives *sub rosa* in many of the world’s most attractive cities, where people are able to make a sustainable living through a combination of legitimate work and illicit activity—as long as they don’t challenge the authorities.

- **Financial reforms fail to bring stability** to traditional financial institutions or the economies that depend on them.
- **Distributed alternative currencies** rapidly gain widespread use, frustrating attempts by governments to regulate and tax them.
- **Steep increases in unemployment** drive almost half of urban populations into the informal economy.
- **Entanglement of government**, business, and organized crime defies anti-corruption efforts.

LINKS TO FORECASTS:

■ **HYPER-URBANIZATION** fills the cities with people who have lived their entire lives in informal economies and can't be accommodated in the formal economy.

■ **DEMATERIALIZATION** drives widespread unemployment and a culture of digital piracy.

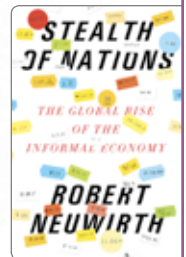
■ **SOCIAL PRODUCTION** fuels alternative currencies and the informal economy, adding illicit as well as legitimate opportunities for people to create value.

■ **INFORMATION INTENSIFICATION** makes it easy to obfuscate criminal connections to legitimate trade and institutions.

SIGNALS

Global shadow economy accounts for growing percentage of GDP

Système D—French shorthand for “l’économie de la débrouillardise” or the informal DIY economy—demonstrated itself to be particularly resilient in the face of the global economic crisis of 2008–2009. Deutsche Bank demonstrated that, during this period, the European countries with the most active unlicensed and unregulated sectors fared better than more economically formalized nations. In his new book, *Stealth of Nations: The Global Rise of the Informal Economy*, Robert Neuwirth theorizes that the global shadow economy, taken as a whole, may be the fastest growing and most important economy of all in the coming decades.



fij.org

Bitcoins and the Darknet

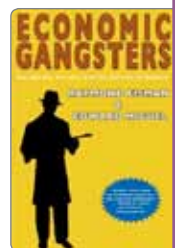
At the high-tech end of the feral economy, a system of increasingly complex and sophisticated tools is emerging for tech-savvy businesspeople operating in extralegal environments. Bitcoins are one of a number of emerging alternative currencies that allow large financial transactions to take place outside of the view of any regulatory agencies. The Darknet, a shadow side of the Internet impermeable to search engines, deals in currencies like the Bitcoin and purportedly offers access to a wealth of underground transactions in everything from drugs to missiles.



prospectingjournal.com

“Economic gangsters” spread corruption, violence, and poverty

Economic Gangsters, already a half decade old, chronicles the ways that corruption and violence serve as key business strategies for highly organized commercial operations around the world. Called “Freakonomics for the Third World” by the *Daily Telegraph*, the book demonstrates how, in a climate of lawlessness, calculated risks for business operations can range from simple corruption and theft to murder.



economic
gangsters.com

STARTING IN MENDOCINO COUNTY AND SPREADING THROUGH MOST OF NORTHERN CALIFORNIA AS WELL AS PARTS OF OREGON AND WASHINGTON

, a veiled economy takes root on American soil. The local economy, already dependent on cultivation of marijuana, transitions to an opium economy, co-opting local law enforcement and political authorities and creating an appearance of an orderly and even bucolic society. Behind the veil, however, a globally connected, sophisticated parallel economy run by well-structured, well-armed cells of organized crime supplies crack cocaine, heroin, and pot to the rest of North America. Farms that used to hire Hispanic immigrants are now owned and run by Mexican and Russian cartels. A national campaign against California—long perceived by many as a cultural threat to the rest of the country—focuses on “protecting our nation’s coastal resources.” Federal authorities claim modest success in occasional, heavily publicized but intentionally limited raids. The situation leads to comparisons with the U.S. experience in Afghanistan. The label Mendokistan surfaces and sticks.

- Passage through large sections of Northern California, Oregon, and Washington is carefully monitored and controlled by deliberate neglect of roadways and aggressive highway patrol by officers who are integrated into the local power structure of organized crime.
- Distributors are recruited from impoverished communities adjacent to the Mendokistan territory, where corporate farms have displaced as much as 25% of jobs and foreclosures have left ghost towns in their wake. These distributors constitute the core consumer base of these communities.
- Within the borders of Mendokistan itself, money flows freely and creates entrepreneurial opportunities for small local businesses to thrive. Some observers even point to the region as a model of successful local economies.
- Unable to tax illicit drug wealth, state governments struggle to provide robust services and attract committed public servants, opening the door to growing corruption within the public sector.
- As Mendokistan expands its market penetration, global competition triggers hostilities that force national governments to get involved. The structure of drug markets thus increasingly determines the shape of global warfare.
- Analysts worry that “the Mendokistan situation” will eventually lead to a U.S. civil war fought, in part, by foreign nationals.

- **Authorities effectively blockade** large sectors within a country that prides itself on free movement.
- **Local populations tolerate** a transition from marijuana to opium cultivation.
- **The Northern California law enforcement** community is nearly entirely corrupted.
- **California's Central Valley fails to recover** from economic collapse, resulting in persistent double-digit unemployment across many job categories.
- **The drug trade becomes the dominant economy** for a sizeable region of the United States.

LINKS TO FORECASTS:

- **HYPER-URBANIZATION** of San Diego, Los Angeles, and the San Francisco Bay Area leads to enclaves of urban wealth isolated from impoverished rural areas of California.
- **DEINDUSTRIALIZATION** creates an unexpected alternative economy that leverages a weakened state, low employment, and pockets of extreme wealth.
- **SOCIAL PRODUCTION** disrupts a growing number of sectors, reducing reliable wage labor opportunities and creating a shadow infrastructure for trade in illicit drugs.

SIGNALS

Marijuana estimated to be a multi-billion-dollar industry nationwide

CNBC recently aired a story on the growth of the marijuana industry in Mendocino County, where the drug is already the major cash crop in a county known for organic farms, dairies, livestock, and wine. The story highlighted the increasing violence associated with the illicit industry, as well as the growth of the marijuana industry nationwide.



cnbc.com



cnbc.com

Sheriff murdered in Mendocino opium field

While inspecting forestland in Mendocino Country, former Fort Bragg, CA, Mayor Jere Molo was murdered. The suspect is a former marijuana grower (allegedly schizophrenic) who was tending an opium field that was his primary source of income. The sheriff's department was slow to confirm that opium poppies were found at the scene of the murder, and some residents point to that reluctance as evidence of the corruption of local law enforcement by the growers.



nydailynews.com



national
geographicstock.com

Survival in California's Central Valley may depend on drug trade

Victor Davis Hanson posted an account of his tour of the Central Valley farmsteads, documenting the devastation of the 20- to 100-acre farms, the shutdowns of food processing and equipment manufacturing plants, and the effects of a 17%–20% unemployment rate. He points out that despite widespread joblessness and dependence on public assistance, vast numbers “enjoy the technological veneer of the middle class. California has a consumer market surely, but often no apparent source of income.”



nationalreview.com

MANY OBSERVERS CRITICIZED THE 2009 DECISION BY FRENCH PRESIDENT NIKOLAS SARKOZY TO EMBRACE “GROSS NATIONAL HAPPINESS” AS A POLICY DIRECTIVE,

but a decade later, the majority of nations embrace the measure. Now, as Gross National Happiness has become a mainstream policy around the world, France is taking another bold leap into experimental governance methods, embarking on what it calls “Microbial Government.” Inspired by research showing the influence of bacteria on emotional and cognitive health, and combined with a Gallic penchant for culinary innovation, France has become the testbed for a public health initiative to carefully regulate gut flora and biota at the national level. Microbial characteristics and their impacts on emotions have been systematically categorized and standardized. This science has allowed France to rewrite its nutritional guidelines and food regulations to account for the microbial make-up of all consumables, with a focus on minimizing food-borne “stress microbes.” The French government is also renegotiating trade agreements to penalize imports with negative biotic-caused emotional effects. Most spectacularly, nationwide microbial weather maps predict and respond to changes in the microbial ecology. France allocates substantial scientific and governmental resources to this project, and while familiar howls of derision are levied at the French government, the world watches to see if governance at the microbial level will result in happier individuals—and a happier nation.

- Policy is enacted at the national level, but more regionalized and individualized guidelines are developed as well.
- Food imports are held up at the border, and shouts of “trade war” riddle conversations with countries who export to France. As tensions ratchet up, French tabloids and blogs are filled with stories of nefarious Brits, Germans, and Americans trying to introduce “stress microbes” into the food supply.
- Genetically modified crops are designed to improve the probiotic potential of major food sources, and an “organic” vs. “artificial” biome debate emerges. Leading French academics start referring to “new organic”—or *nouvelle bio*—cuisine.
- Many other European countries watch France closely, with Denmark the first to seriously consider passage of a similar microbial regulatory policy. German citizens express interest in the idea, but an anti-regulatory government makes clear its opposition. In England, conversely, government exploration of the policy quickly leads to a public backlash.
- Even where officially dismissed, the French approach gains advocates among the wealthier and more educated citizens of other developed countries, who seek foods that meet France’s standards.

- **Gross National Happiness** becomes a legitimate way for governments to measure success, paving the way for even more radical governance models.
- **Research on the gut-brain connection** and the role of the vagus nerve as an emotional-cognitive regulator reorient how we think about embodied minds.
- **Public health policies** become complementary to economic policy, recognizing that a healthy and happy workforce is more creative and more productive.

LINKS TO FORECASTS:

■ **HYPER-URBANIZATION** demands new methods and new precision in the management of microbes as population density increases radically.

■ **BIOMOLECULARIZATION** shifts the focus of health interventions from individual bodies to extended microbial ecologies, laying the groundwork for transpersonal regulations.

SIGNALS

France embraces Gross National Happiness

In 2009, French President Nicolas Sarkozy announced that France would start measuring its economic progress in terms of “Gross National Happiness,” the concept pioneered by Bhutan that integrates happiness, well-being, and sustainability into consideration of economic success.



blog.foreignpolicy.com

Ingestion of *Lactobacillus* microbes regulates emotional behavior

Research has shown that mice fed *Lactobacillus rhamnosus* microbes showed significantly less stress, anxiety, and depression, as well as significantly lower levels of the stress hormone corticosterone. The microbe appears to work by regulating the central GABA receptor expression via the vagus nerve.



guardian.co.uk

Online sharing site for microbial profiles

The online sharing site, my.microbes.eu, is following in the footsteps of social platforms like 23andme.com (for genetic profiling) to build a global database of microbial profiles. The goal? To map the global distribution of microbes and discover their interactions with drugs, diet, and ultimately well-being.



my.microbes.eu