THE/NUDGE Prize

DCM SHRIRAM FOUNDATION

Unlocking Investments to shape India's AgWater future

Volume 1

Mapping India's AgWater Landscape

Challenges, Startups, and Investment Gaps

India’s agriculture sector uses 80–90% of the country’s freshwater, yet remains inefficient and highly vulnerable to mounting water stress. Promising solutions exist, and new technologies are emerging, but a chronic lack of investment is stalling transformation.

This two-volume report maps India’s AgWater investment landscape — spotlighting where catalytic capital is most needed and the bold opportunities to build a water-secure agricultural future.

Volume 1 explores the scale, urgency, and potential of the AgWater sector. It examines how water is used in agriculture, the drivers of scarcity, the innovations underway, and why investment still lags despite the clear need.

Foreword

We have developed a two-volume AgWater Investment Point of View focused on the water challenges facing Indian agriculture. Volume 1 maps the current landscape – the scale of the water crisis, emerging innovations, and critical investment gaps. Volume 2 builds on this foundation, outlining what it will take to scale promising solutions, unlock capital, and deliver impact at the ground level.

This PoV examines the urgent need to address water stress in farming, explores how strategic investment can respond to these complex challenges, and demonstrates how innovation can deliver tangible benefits to farmers.

Rather than presenting definitive conclusions, this document serves as a foundation for broader discussion. We believe that collective wisdom from across the ecosystem will strengthen and enrich this thesis.

It outlines the necessary ecosystem to support AgWater innovation, including the roles of incubators, accelerators, investors, policymakers, entrepreneurs, and industry experts. In this document we have incorporated diverse viewpoints and takeaways from meaningful conversations about developing scalable, sustainable solutions in agricultural water management.

We view this two-volume AgWater investment PoV as a catalyst for substantive dialogue and a compelling case for directing capital toward AgWater innovations.

Hemendra Mathur
Investor & Venture Partner,
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Acknowledgement

This report has been shaped by the knowledge, experience, and generous contributions of many across the AgWater ecosystem.

Our sincere thanks to ecosystem experts **Hemendra Mathur, Romiel Samuel, Arindom Datta,** and **Ankit Chandra,** whose thought partnership and sectoral perspectives enriched this work meaningfully.

We are especially grateful to the startup founders, operators, and experts who took the time to share their on-ground experiences and strategic perspectives, including **Naveen Singh (PhyFarm), Tarang Patel (Intech Harness), Shrilesh Mande (IndusTill), Jasveer Singh, Sri Malladi (AgriRain Agro Industries Private Limited), and Rajesh Pandey (AgAutomate Private Limited).** Your insights brought depth and clarity to our understanding of this evolving space.

We also thank the teams atorganisations such as **Avanijal Agri Automation, BharatRohan Airborne Innovations, EF Polymer, CultYvate, JeethTechnical Inventions and Products, Oorja Development Solutions, Oscillo Machines, and Virentiatech (Virenxia)** for engaging with us and generously sharing your learnings.

We also acknowledge **Tracxn** for their curated data support, which provided a strong foundation for several trends highlighted in this report.

To the broader AgWater community - thank you for your relentless commitment to solving one of agriculture's most pressing challenges. This report is a small step forward in what we hope will be a bold and enduring AgWater investment journey.

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About the
DCM Shriram AgWater Challenge

Smallholder farmers across India face increasing water stress due to unpredictable weather, groundwater depletion, outdated farming practices, and fragmented technological solutions. These problems threaten farm productivity and income generation, making water efficiency critical for sustainable agriculture. The DCM Shriram AgWater Challenge was launched in June 2023 with a bold mission: to secure water and livelihoods for 1 million farmers in India by transforming water use in agriculture.

The DCM Shriram Foundation, along with The/Nudge Institute, designed and launched this challenge to identify and scale innovative and affordable AgWater technologies that improve water use efficiency, boost crop productivity, and strengthen the economic resilience of farmers. From 134 applications across the nation, 16 AgWater innovators were selected to develop solutions for India's most water-intensive crops - wheat, paddy, sugarcane, and cotton, backed by a ₹2.6 Cr prize purse to support their efforts.

Beyond the innovators, a diverse ecosystem of investors, academia, policymakers, and implementation partners played a crucial role in building awareness, generating evidence, and strengthening the sector's investability.

As the challenge evolved, it became a platform for testing, learning, and scaling solutions that address water sustainability, ensuring that smallholder farmers can thrive in a rapidly changing agricultural landscape.

This report and its contents are based on learnings and field evidence gathered over the last 18-20 months of the challenge.

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Executive Summary

Agriculture is the foundation of India's economy. In FY 2024, it contributed about 16% to the GDP and employed 55% of the workforce. Decades of toil have taken the country from food deficiency to a leader in food production, but it has also impacted our water resources. As we face a looming water crisis, it becomes difficult to ignore the impact of agriculture on our water use patterns.

India not only consumes more water than other top performers in agriculture, but we are also less water efficient compared to these countries. Over time, this has led to a situation where water reserves are being depleted and farms are starting to dry up across the country. Affected farmers are taking drastic measures to combat the issue — from investing lakhs of rupees to install new infrastructure to migrating and leaving the occupation altogether. Unless our water use efficiency meets global benchmarks, this will become the reality for every farmer in the near future.

Changing the status quo will require a concerted effort from multiple actors, but a prominent role will be played by startups developing future technology applications to improve water use efficiency (AgWaterTech). However, this landscape is underfunded and requires significant capital investment to combat the problem and unlock a market of INR 2500–3000 crores (USD 280–350 mn).

Since 2010, 70–100 AgWaterTech startups have been founded that are still active today. These startups are largely divided across three categories - bio-inputs and stimulants, smart irrigation solutions, and irrigation hardware — with the bulk (70–80%) present in the smart irrigation category. Startups in this category build solutions that use data from soil moisture sensors or satellites to automate irrigation scheduling or provide advisory services across the 55% of farmland that is covered by irrigation today. Bio-inputs and stimulants on the other hand can operate in both irrigated and rain-fed setups, but are a much smaller category due to the importance of R&D in achieving differentiation.

Almost 20–25% of currently active AgWaterTech startups are deadpooled, i.e. they are at immediate risk of shutting down. Startup activity is also dwindling, as the number of new startups has reduced significantly in the past 5 years. Even funded startups are underperforming vis-à-vis those in countries like the USA and Israel, with much lower numbers across deal size and stage. This dearth of funding activity could be a result of multiple factors that impact their investability, chief among them being:

This dearth of funding activity could be a resultant of multiple factors that impact their investability, chief among them being:

- *The disproportionately high share of small and marginal farmers in India's agriculture sector*
- *Extremely long gestation periods and time to obtain returns for AgWaterTech startups*
- *Lack of data on consumption of agricultural water*

Market activity in irrigation technologies in India has conventionally scaled through government investment in the form of state-level and central subsidies, but only after large scale adoption was demonstrated. This was true in the case of micro-irrigation, where Jain Irrigation and Netafim India were the early drivers.

AgWaterTech startups may take the same path, but will require investment of ₹ 500-600 crores across the bio-input and smart irrigation categories to showcase similar levels of large-scale adoption. Field evidence gathered during the DCM Shriram AgWater Challenge demonstrates how these solutions are improving scalability by reducing solution costs for smallholder farmers, easing distribution through direct sales and formal partnerships, etc. while also enabling water savings for individual crops.

₹50-60 CR* IN THE NEXT 2 YEARS CAN UNLOCK

₹3000 CR MARKET BY 2035

Category	*Investment needed by 2035*	*Scalability*
Bio-inputs and stimulants	₹ 150 - 200 cr	
Soil moisture and climate sensors	₹ 100 - 150 cr	
Satellite and aerial remote sensing	₹ 100 - 150 cr	
Automated irrigation systems	₹ 25 - 50 cr	

High Medium Low

How do we make the above a reality?

Our point of view is that investors and capitalproviders need to allocate ₹ 50-60 crores and outline key thresholds for results based financing over the next two years

Startup founders and support actors from the ecosystem need to action the following pathways to see returns on the above investment :

- *Generate digitally verifiable evidence through large scale demonstrations*
- *Work with government actors to define unique value propositions and financing models across sharply defined farmer segments*
- *Partner with scaled distribution players to streamline distribution networks for AgWaterTech solutions - building better accessibility*
- *Standardise data collection methodologies for water use / source utilisation and build integrations with emerging digital infrastructure for agriculture*

1.

Landscape of Agriculture and Water (AgWater)

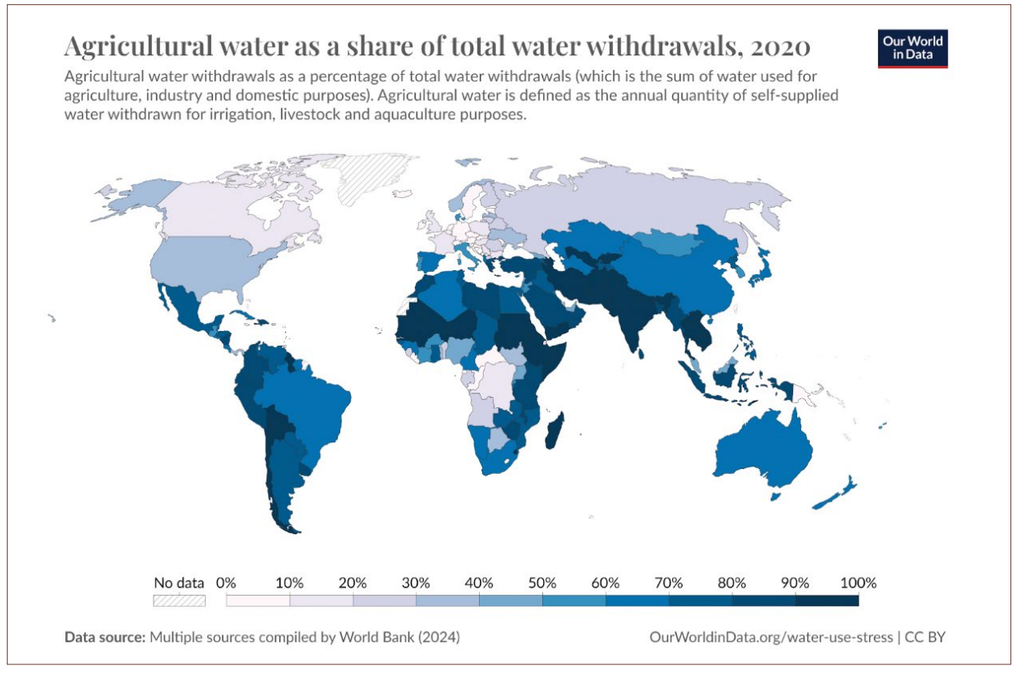
Case for AgWater as an area of focus

In the summer of 2024, the city of Bangalore faced an acute water shortage. Faced with the possibility of taps running dry, the city's governance bodies took drastic steps to ensure that they kept flowing. From controlling domestic and industrial water use to mandating the use of treated wastewater, the steps taken were able to mitigate the severity of the issue at least for the time being.

Is the issue of water scarcity limited to just Bangalore? Data suggests otherwise. In industrial states like Maharashtra and Andhra Pradesh, as well as in agricultural states such as Uttar Pradesh and Punjab, water levels are below their 10-year averages. In Karnataka, the main reservoir has dropped to only 16% capacity. This is the lowest level for March since 2019, when reservoir capacities plummeted to 35%, leading cities like Chennai to experience severe water shortages. The situation is even more dire in rural India. Villagers in the water-stressed regions of Marathwada and Vidarbha in Maharashtra receive water from tankers only once every eight days and often have to pay up to Rs. 600 for a drum of water. This crisis has had a devastating impact on their crops. Similarly, several localities in Bihar's Gaya are grappling with water shortages. Meanwhile, as temperatures soared in Uttarakhand during the summer, the water shortage in this hilly state also worsened.[1]

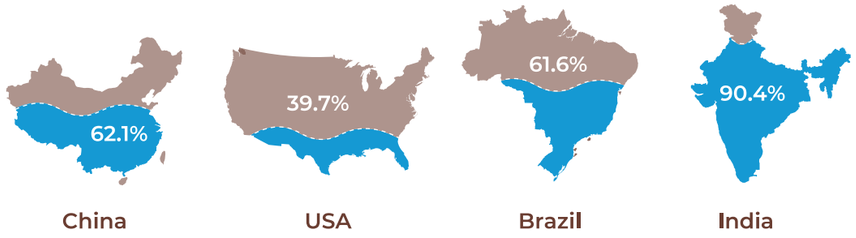
In India, domestic water use accounts for less than 10% of the total freshwater withdrawals. That agriculture consumes the greatest amount of water in India is not up for debate, though the exact statistics may differ from source to source. While some indicate that 80% of water withdrawals are used in agriculture, others quote 90%. Either way, the numbers are far higher when compared to the rest of the world. Globally 70% of freshwater withdrawals are used in the agricultural production of food, fibres, livestock and industrial crops. However, this share varies significantly by country. On average, the agricultural water use for low-income countries is much higher than it is for high-income countries. Enhancing water-use efficiency in agriculture offers a significant opportunity to re-allocate water savings to meet the increasing domestic needs, which are expected to double of what they are today.

[1] *Water crisis 2024: Bengaluru parched, but cities across India struggling too*



India is one of the world's leaders in agricultural production. India is also a prominent virtual water exporter to 199 countries and territories, estimated to export about 26 billion litres annually between 2006 and 2016, comprising commodities such as rice, sugar, Basmati rice, buffalo meat, Raggi, and maize.2 But how does our water use compare to other top producing countries?

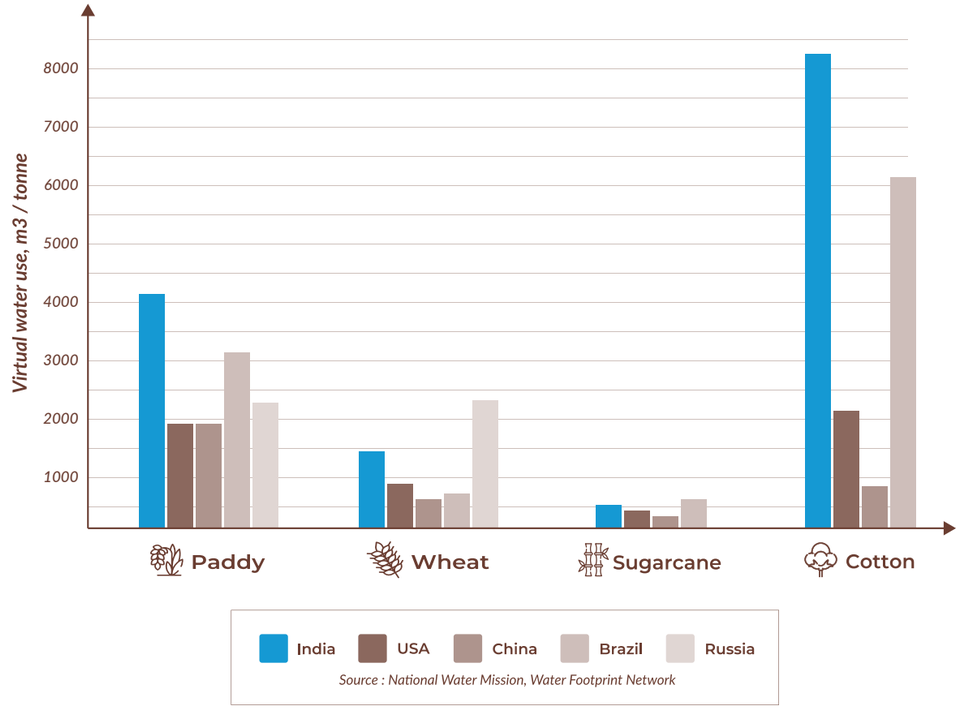
India's water use is much higher than other top agricultural producer



Source : Our World in Data

As the above table shows, India consumes significantly more water for agriculture - both in terms of volume and % of freshwater withdrawn - compared to other major agricultural producers. Our consumption as % of total water withdrawn is comparable to countries like Ethiopia, Thailand, and Bolivia, countries where agricultural production volumes are 10-20% of India's.

[2] *Virtual Water Export from India's Strategic Stretches vs Leverages*



Now comparing agricultural water use isn't an apples to apples exercise. Multiple factors such as rainfall patterns, soil type, crops cultivated, and even workforce composition dictate the use of agricultural water. Despite the above, it is also true that India is less water efficient than its global counterparts.

Reports such as "Agricultural Statistics at a Glance" (2020–2022) and studies from the Indian Council of Agricultural Research (ICAR) and The Energy and Resources Institute (TERI) highlight disparities in water use efficiency across different states and crops in India as well. For example, in wheat cultivation, states like Punjab benefit from intensive, well-managed irrigation systems that promote higher efficiency, while other major wheat-producing states such as Haryana and Uttar Pradesh face challenges that lead to relatively higher water consumption. Similarly, in rice production, regions with abundant rainfall and robust water management, like West Bengal, tend to achieve greater efficiency compared to states such as Uttar Pradesh and Odisha, which rely more on flood irrigation. In the cotton sector, efficiency is particularly sensitive to local conditions; arid regions like Gujarat and Maharashtra often encounter higher water demands, whereas Telangana has made strides by adopting modern irrigation techniques. Sugarcane, known for its significant water requirements, also exhibits varied efficiency across regions, with areas in Maharashtra struggling more compared to states like Tamil Nadu that have embraced advanced water-saving practices. Despite low water use efficiency in many regions, agricultural production in India continues.

to be encouraged to high levels. This is partly driven by policy incentives such as substantial subsidies for water and power, assured procurement systems, and a strong market push for higher yields. While water productivity per unit input remains suboptimal, production targets are met, and often exceeded, by relying on excessive water use.

Agriculture is the primary source of livelihood for

~55%

of India's population and is going to continue

However, by 2030, India will have a freshwater shortfall of about 50 percent. Agriculture is the primary source of livelihood for ~55% of India's population and is going to continue to remain a mainstay for the near future. Of the farmers using irrigation in the country, 70-80% are groundwater dependent, with the bulk being small and marginal farmers with less than 2 hectares of land.

In order to combat the above issue, India's irrigation water use efficiency needs to be brought up from 38% to the benchmark of 50-60% found in most developed countries. While this goal will rely heavily on governments and civil society actors, the role of markets - or particularly startups developing technology to target agricultural water use efficiency - is equally important.

Investing in these AgWaterTech startups can potentially unlock a market worth INR 2500-3000 crore (USD 28-34 crore) in the domains of bio-inputs & stimulants and smart irrigation by 2035. The solutions are largely applicable to the irrigation market; however, solutions such as bio-inputs and stimulants also have the potential to support rainfed farmers, a substantial number of whom are smallholder farmers. In subsequent sections, we will highlight how this sector is underfunded and requires significant investment in the coming years to be catalysed.

AgWaterTech startups can potentially unlock a market worth

₹ 2500-3000 crore
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2.

AgWaterTech Startups in India

Technology and innovation landscape and trends

50-60% of India's agricultural land is rainfed, but the remaining have long relied on traditional irrigation methods such as canal systems, open wells, and flood irrigation, which, while time-tested, suffer from inefficiencies like high water wastage, uneven distribution, and dependency on erratic monsoons. These methods have supported smallholder farmers for generations but are increasingly unsustainable given rising water stress, depleting groundwater levels, and climate variability. Additionally, traditional techniques often require extensive labor and infrastructure, making them less adaptable to modern agricultural challenges.

Micro-irrigation techniques, including drip and sprinkler irrigation, gained traction as a more efficient alternative. By delivering water directly to plant roots or distributing it in a controlled manner, these systems reduce wastage, enhance soil moisture retention, and improve crop productivity. Government initiatives such as the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) have played a key role in promoting micro-irrigation adoption. However, high initial costs, lack of financing, and maintenance challenges continue to hinder large-scale implementation, especially among smallholder farmers.

Advancements in IoT, remote sensing, AI-driven analytics, biologicals, and automated irrigation systems are shaping the next phase of irrigation in India. Precision irrigation leverages real-time data on soil moisture, weather conditions, and crop water needs to optimise water usage, while bio-inputs enhance soil water absorption or retention, being equally relevant for rainfed farming.

2.1 Categories

Since 2010, approximately 70-100 AgWaterTech or irrigation technology startups have been founded and are still active in India. This excludes incumbents that were founded before 2010 like Jain Irrigation or startups that have shut down in the aforementioned period.

Broadly, we can segment these startups into the following categories.

Bio-inputs and stimulants	Soil moisture and climate sensors	Satellite and aerial remote sensing	Automated irrigation systems
EF Polymer, Pehle Jaisa, Ag Cropchem & more	CultYvate, Farmsys, SoilSens & more	BharatRohan, Arms4AI, Rivulis & more	Phyfarm, SICCA, IndusTill & more

A. Bio-inputs and stimulants

Bio-inputs and stimulants enhance water use efficiency chiefly by improving soil moisture retention and water holding capacity, being equally relevant for rainfed farming.

While India has over 500 startups that are developing biologicals for agriculture, most tend to develop biofertilisers or organic pesticides. For 2023, the global AgTech funding (AgFunder) for Bioenergy, & Biomaterials and further investments in Ag Biotechnology spanned ~350 deals and overall funding stood at $4.9Bn - making it one of the most invested AgTech models. However, these models include a host of interventions across animal health, breeding, feeding to biopesticides. Within which, biostimulants are a relatively smaller percentage overall. There are startups that are developing biologicals to improve soil health, which has an indirect impact on water use, but the number of startups that are directly targeting water absorption and hence, water use efficiency, appear to be fairly low. Among these startups, the vast majority are trying to address the high cost of biological products by integrating with agri-waste centers and decentralising the production of these materials.

Despite the low density of startups in this category, the potential is high. Firstly, the application of bio-inputs is largely similar to traditional practices that are followed by India's small and even marginal farmers. Secondly, these products can be sold in small packets which improves the ease of distribution. Lastly, these solutions also have a positive impact on soil health, which improves the longevity of the farmer's land. Each of these factors can drive farmer adoption and potentially address the challenge of AgWater consumption, due to which biologicals are a key area of focus as we outline the capital needs in section 4.

B. Sensors *(including both soil moisture & climate sensors and satellite & aerial remote sensing)*

Sensors can improve water use efficiency by providing real-time data, optimising irrigation, and reducing water wastage. They enable precision agriculture, ensuring that crops receive the right amount of water at the right time.

They are largely IoT based and rely on obtaining data on soil moisture levels at different depths through tensiometers or capacitance probes or through evapotranspiration sensors that can estimate water loss from soil and plant surfaces.

Remote sensing can include multispectral or thermal imaging performed by satellites or drones. While sensors operate largely at a farm or plot level, remote sensing covers a much larger area. Due to this, remote sensing startups tend to focus on governments or large corporations as their buyers, but efforts to build individual level intelligence are also underway by some of the major players in this subcategory.

In particular, this category is an essential building block for the AgWaterTech industry, as it can not only enable more precise advisory, but can also be interoperable with smart irrigation controllers and other automation solutions.

There are 35-45 startups in India that are developing either sensors or remote sensors to enable irrigation optimisation. However, more than half of these startups were founded in a 4 year window between 2016-19. Since then, the number of new startups in this category has significantly reduced outside of a few players in the remote sensing space. Given the importance of the category and the dearth of new players, sensors are another key area of focus in section 4.

C. Automated irrigation systems

Irrigation automation solutions are a broad space that may include smart automation solutions that rely on water use or soil moisture data to optimise irrigation, or remote automation solutions that enable scheduling of irrigation operations through a mobile application and remove any manual intervention.

These solutions are largely plug-and-play and can operate with existing infrastructure to ensure that water delivery is automated.

25-30 startups operate in the irrigation automation category, with the bulk of activity coming post 2015. Unlike the sensor category, ~30% of new startups have emerged in the past 5 years. This means that while the number of new entrants in the space is reducing, it hasn't diminished completely.

While smart automation systems rely on soil moisture and other data to enable precision agriculture, automation scheduling systems still rely on manual intelligence to determine water use. Due to this, their ability to reduce water consumption is still unclear but they are currently seeing an increase in adoption as they make the farmer's life easier by removing the need to go to the field to operate the pump. There is some evidence of reduced water wastage, as pumps can automatically shut off based on control and scheduling. However, without incorporating data, the evidence remains scattered.

D. Irrigation hardware

Irrigation hardware and infrastructure largely include developers of micro-irrigation solutions or components. Despite government schemes focusing heavily on these solutions, the startup activity being low could be attributed to a simple factor. Large, well-established companies like Jain Irrigation, Netafim, Rivulus, and Rain Bird dominate the micro-irrigation space. These companies have extensive networks and offer proven, scalable solutions. New startups may find it difficult to compete with their scale and customer trust. Additionally, micro-irrigation systems require significant upfront investment in hardware and need large scale deployment before seeing returns. Despite this, smart remote sensing and automation-backed micro-irrigation offer significant potential for deep learning and impact on water-use efficiency.

2.2 Key innovation trends

Technical or business model innovations are enabling startups to enhance their product offerings or lower scale barriers. A few of them are highlighted here.

A. Revenue strategies have transitioned from

In their initial stages, many AgWaterTech startups had a revenue model based solely on selling hardware such as remote controllers, IoT devices, and soil moisture sensors. Over time, these startups have all transitioned towards bundled offerings that include software and / or services.

Overall, there are multiple emerging cross-subsidisation strategies between hardware, software, and services in the Indian AgWaterTech space. Some companies still generate revenue primarily through hardware sales and use these to subsidise their software offerings. For example, companies may sell soil moisture sensors, remote controllers, and IoT devices and provide field-level data analytics support to inform decision-making such as apps and cloud or API integration as part of the hardware purchase (e.g., KisanRaja, Mobitech Wireless). Other companies use software subscriptions to subsidise their hardware, which may be provided at low or no cost. These companies generate recurring revenue through monthly software subscriptions. They typically provide access to data and services that underpin actionable insights, such as weather and irrigation management APIs or Vegetation Index (NDVI) data (e.g., GramworkX).

Finally, some startups do not sell hardware at all and have transitioned to full-service models. Oorja, AgriRain, and Claro Energy operate through a pay-per-use irrigation model. Revenue generation is through providing irrigation services or subscriptions offering their irrigation systems and hardware equipment for free.

[3] *This segment has been derived from the FY 2023 annual report's section "Understanding the Agtech Ecosystem in India can spur future investments" published by The Daugherty Water for Food Global Institute (DWFI) and conversation with Nick Brozović, Director of Policy and Ankit Chandra, DWFI Program Research Manager*

B. Bundling and vertical integration of products / services to address multiple customer pain points is increasingly common

As AgWaterTech startups have gained experience with sales to farmers, they have also gained understanding of the larger agricultural ecosystems in which they operate. Some have started to innovate their business models around bundling and vertical integration of multiple products and services beyond water management.

These startups provide innovative solutions which complement the farmer's need to irrigate while utilising the same infrastructure for other farm operations. They may also bundle other offerings such as nutrients or fertigation, post-harvest crop management (cooling / cold storage, milling, etc.), sensor devices, data analytics, or other digital marketplace services.

This kind of vertical integration allows startups to build cost-effective, strong relationships with their customers by providing solutions for multiple problems around agricultural production through a sole marketing channel. For example, startups like GramworkX and Fasal bundle hardware and software products. Among other products and services, they offer IoT devices, soil moisture sensors, remote motor control devices, software packages, crop protection, and farm financial management. Startups like Oorja deliver their business model by bundling solar irrigation provision with postharvest cooling and milling using solar technology. Similarly, Ecozen, an IoT-enabled hardware provider, bundles irrigation and cold storage services.

However, startups have to solve for both bundling new products and integrating into new markets. A few pathways on offer are to develop products in-house, or enter new partnerships with other private companies, or they may acquire, or be acquired by, other startups. As of the end of 2022, the only example of an Indian AgWaterTech startup exit is GramworkX's IP acquisition by WayCool. WayCool is a downstream supply chain agritech company that provides cold chain as well as farm intelligence. WayCool's acquisition of GramWorkX is a clear example of vertical integration.

A relatively unexplored area of vertical integration lies with financial products such as microloans or weather insurance, which also addresses critical farmer pain points.

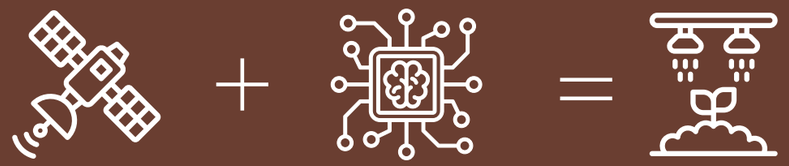
C. Building interoperability between products

Interoperability can be a game-changer for AgWaterTech startups in India by enabling diverse systems and data sources to work together seamlessly, for e.g. by combining remote sensing data with intelligent automation solutions. When remote sensing data is interoperable with intelligent automation systems, it creates a comprehensive picture of field conditions. For example, satellite imagery showing moisture stress can trigger automated irrigation systems to adjust water delivery accordingly. This leads to improved water-use efficiency and better crop yields.

By leveraging interoperable systems, startups avoid the high costs of building proprietary solutions from scratch. Instead, they can integrate best-of-breed technologies and focus resources on refining user interfaces, analytics, and customer support. This approach can lead to faster product development cycles and more tailored irrigation practices to local conditions using a mix of data sources, ensuring both smallholder farms and large agricultural operations can benefit.

In pilot projects across parts of India, Fasal has been testing systems where data on soil moisture, weather conditions, and crop health (sourced via remote sensing) feeds into an intelligent automation platform that adjusts irrigation schedules automatically. This integration not only helps reduce water usage but also improves crop productivity by ensuring that irrigation is both timely and precise. Rivulus, the micro-irrigation player also has a similar proposition, Manna, that empowers real time irrigation advice factoring in remote sensing data on a geotagged cultivation plot along with weather and crop life stage data to improve farmer's understanding of when and how much to irrigate. Coupled with their micro-irrigation installed base, the overall proposition could significantly impact yield and actualise water savings - enhancing farmer's yield and efficiency of groundwater usage.

Interoperability can be a game-changer for AgWaterTech startups in India by enabling diverse systems and data sources to work together



D. Partnering with FPOs and farmer cooperatives

Farmer cooperatives and Farmer Producer Organisations (FPOs) can be key catalysts in helping AgWaterTech startups scale their offerings faster in India. Their role goes beyond simply aggregating farmers—they offer market access, credibility, and operational support that startups can leverage to validate and refine their technologies, reduce costs, and accelerate adoption.

FPOs unite hundreds or even thousands of small-scale farmers, creating a ready and sizable market for irrigation innovations. This collective demand means startups don't have to reach individual farmers, which can be time-consuming and costly. By collaborating with an FPO, a startup's technology can be piloted and then scaled up across the entire member base, ensuring faster adoption and immediate revenue generation. Farmers tend to trust their cooperatives. When an FPO endorses a new AgWater technology, its members are more likely to adopt it, as they see the FPO as a vetted, reliable partner. This endorsement helps overcome resistance to change—a common challenge with tech adoption among smallholders.

In addition, FPOs provide a structured environment where AgWaterTech startups can run pilot projects. Testing the technology across diverse farm conditions enables startups to gather crucial field data and farmer feedback. This iterative testing and improvement cycle not only increases product efficacy but also builds case studies and success stories that are vital for further scaling.

EF Polymer has signed an MoU with Basix to sell through their network of FPOs. Similar partnerships with Access Development and Sammunati are also in progress, which will significantly improve their adoption rates among small farmers and further ease distribution.

E. Leveraging data as an asset

AgWaterTech startups are uniquely positioned to transform field-collected data into a strategic asset—not only to optimise farming practices but also to drive innovation and create new revenue streams across the agritech ecosystem.

Detailed, location-specific data on soil conditions and water usage can help tailor biological products - such as soil conditioners, bio-stimulants, or water retention agents - to specific crop and soil needs. Data can not only help validate how a biological product improves water retention in specific soils, guiding both product formulation and targeted marketing, but integrating sensor data with product performance metrics can allow organisations to refine their formulations. This creates a powerful feedback loop where product application is continuously optimised based on real-world performance.

Beyond on-farm advisory services, startups can aggregate anonymised, high-quality field data and offer it on a subscription basis to agricultural researchers and insurers. Corporates, especially in water-intensive industries like food and beverage, are also under increasing pressure to report and improve their water stewardship. High-quality, verified data on water savings can be a key input for sustainability metrics or water credit / offset programs, or could integrate with ESG analytics platforms.

How?

Innovations are powering startup growth

Startups are leveraging innovations to either enhance product value or reduce barriers to scale.

Technical Innovations

- AI/ML-powered diagnostics
- IoT-based monitoring systems
- Climate-resilient bio-inputs
- Low-energy water filtration devices

Business Model Innovations

- Pay-per-use models
- Community level service delivery
- Microleasing for smallholder tools
- Direct-to-farmer (D2F) digital platforms

3.

Funding in AgWaterTech

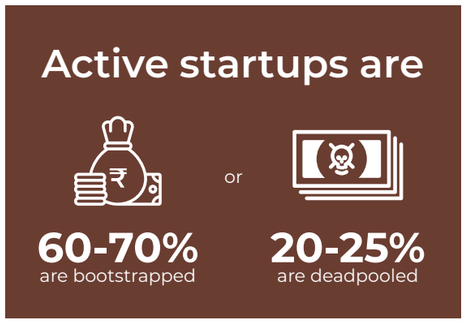
Funding trends in AgWaterTech startups

As highlighted in the previous sections, AgWaterTech startups are in need of capital, but are finding it difficult to acquire it. In this section, we will focus on identifying the current funding trends witnessed in the domain, the type of investors that normally invest in AgWaterTech, and the factors impeding these investors from putting up capital.

3.1 Funding trends

While data on total funding acquired by AgWaterTech startups is difficult to estimate, there are some trends that can be identified based on their funding status.

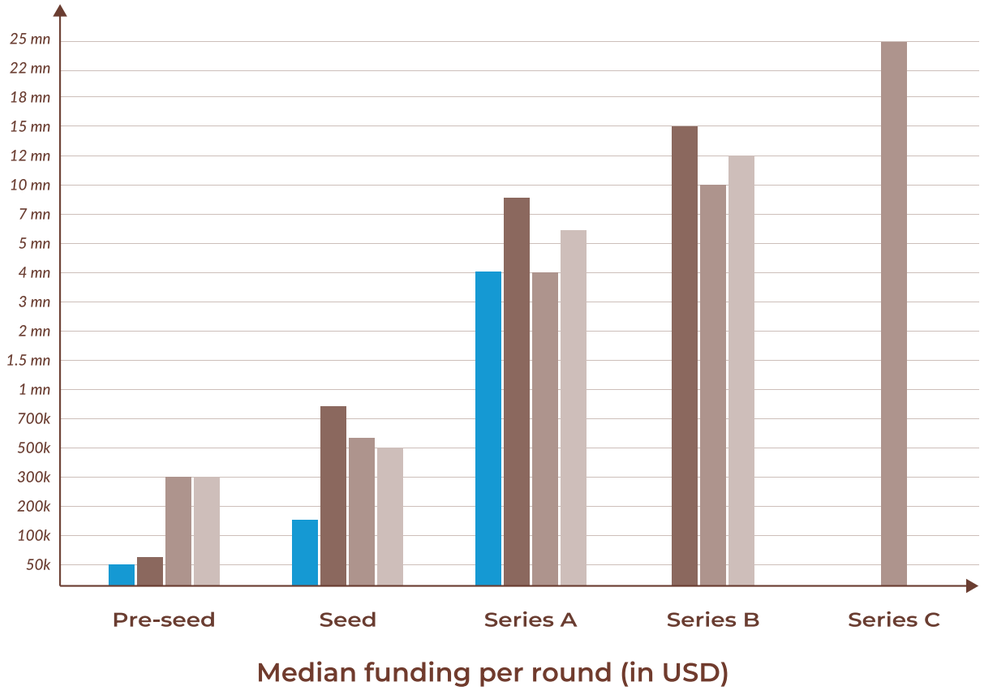
Approximately 60-70% of all active startups in this sector have received no form of external funding. These “unfunded” startups are either bootstrapped or running on friends and family investments. Startups developing sensors, biologicals or automation solutions are more likely to have no external funding. Remote sensing is an outlier in terms of having more funded than unfunded startups, but that could also be a function of the small sample size.



in AgWaterTech is not that alarming. Most of these startups are still at an early stage and often rely on bootstrapping, grants or debt capital over long gestation periods before they become investable. What may be a cause for concern is that 20-25% of currently active startups are deadpooled, i.e. they are at an immediate risk of shutting down. When combined with the dearth of startup activity seen across categories in the last 5 years, the situation starts to become more dire.

As we explore the funding trends across each category, we also tried to compare it with funding seen in AgWaterTech across other countries. As part of this analysis, we looked at funding across countries like the USA, Israel, Germany, Netherlands and Japan. While it’s important to note that this analysis is flawed due to factors like PPP, the maturity of each country’s startup landscape, or the availability of data, it can throw up some insights on the funding activity or inactivity in a country.

A. Bio-inputs and stimulants



Median funding per round (in USD)

India Israel USA Netherlands

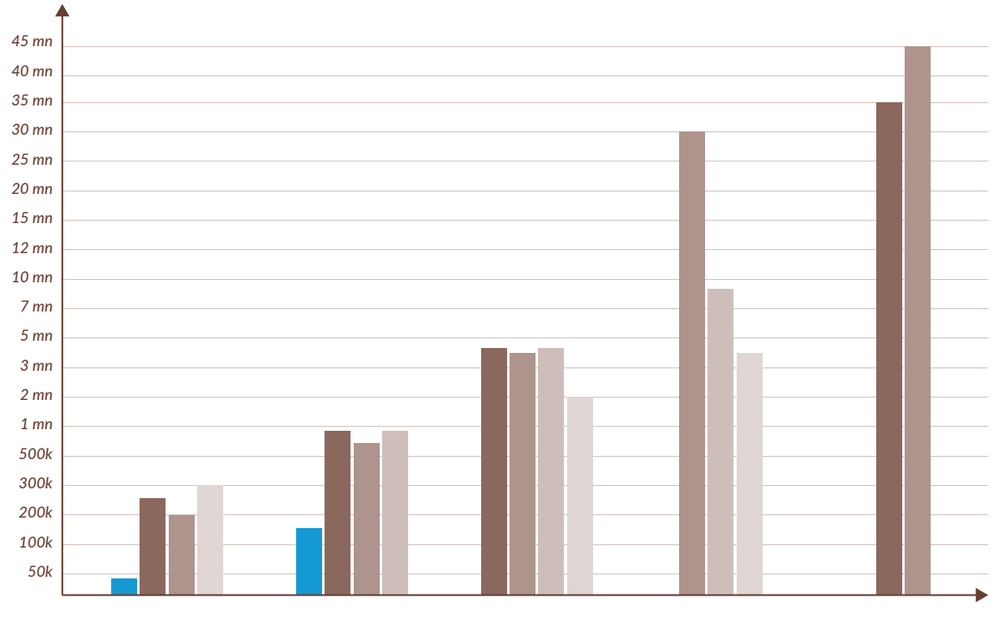
Source : Tracxn

Since the number of startups in the biologicals category in AgWaterTech appears to be fairly low, we looked at biologicals as a whole - which includes organisations producing biofertilisers, pesticides, bio waste composters, etc.

No agrobiological startups in India have received funding beyond Series A. Interestingly, startups in India are gaining a similar amount of funding as those in Israel at the pre-seed stage, but this quickly diverges - Israeli startups gain significantly more funding from seed stage and beyond.

Similarly, agrobiological startups also appear to have received similar amounts of funding to USA and Netherlands at the Series A stage. However, this trend may be a function of the number of Indian startups that have reached this stage - it's possible that startups that gained Series A could be the high performers, and median funding will reduce over time.

B. Soil moisture and climate sensors



Median funding per round (in USD)

India Israel USA Netherlands Germany

Source : Tracxn

Funding in sensors is much less compared to other countries across the pre-seed and seed stages. Not only are the values low, but only 30-40% of startups building sensors are even funded. Of the unfunded startups, more than half are deadpooled. However, despite the low density of startups in this category due to limited R&D capital and infrastructure, the potential remains high.

C. Satellite and aerial remote sensing

Funding across stages in remote sensing is equivalent to top performers in Israel and the USA. While Indian startups such as BharatRohan, Arms4AI, and NubeSol Technologies in this category are yet to reach Series B, almost 55-60% of them are funded - which is much higher than average.

D. Automated irrigation systems

Irrigation automation startups have also received much less funding across stages compared to Israel and the USA. 80-85% of these startups are yet to receive any external funding, but unlike sensors, less than 20% of active startups are at risk of closing. This could be due to a lower upfront cost for building automation solutions. Additionally, this segment in India has considerable state and central subsidy dependencies

3.2 Types of investors

AgWaterTech startups rely on a variety of capital sources, but we will focus on the following five: public sector, venture capital, debt, impact investors, and blended finance.

A. Public sector investments (include innovation schemes)

The Indian government has historically been a significant investor in agricultural water infrastructure, focusing on large-scale irrigation projects, land reclamation, soil conservation, afforestation, and watershed development. These investments are crucial for creating the necessary infrastructure to support agricultural activities. Furthermore, initiatives like “AgriSURE – Agri Fund for Start Ups & Rural Enterprises” (launched in 2024) to support innovative, technology-driven, high-risk, high-impact activities in agriculture and allied areas” and “RKVY - Rashtriya Krishi Vikas Yojana” (launched in 2007 with enhancements going on) for encouraging innovation and agri-entrepreneurs through skill development and financial support” have been prominent in promoting innovation in the agriculture sector.

Type of support :

1. **Grants and Subsidies:** Government programs often fund infrastructure projects like large-scale irrigation systems or watershed management through direct grants or subsidies. Grants usually are catalytic to startups as they are equity free, however, the quantum of grants across this sector is not large enough and therefore, are used in siloed projects.
2. **Debt Financing:** Development banks such as NABARD (National Bank for Agriculture and Rural Development) and state governments issue bonds or access loans for public water projects.
3. **Equity:** In rare cases, government-backed entities may invest equity in public-private partnership (PPP) projects.

[4] *Investment in land and water: India's experience - Hemendra Kumar*

B. Venture capital

Venture capital investments into the AgWaterTech startup landscape are extremely low. A study conducted by the Daugherty Water for Food Global Institute at the University of Nebraska mapped the funding activity of 21 active startups in the agricultural water use ecosystem and found that only USD 52 million was invested by venture capitalists from FY 2018-2022. In comparison, the larger agritech sector raised a total of USD 1.28 billion in FY 22.

Since the study’s conclusion, the agritech sector’s funding fell by a drastic 45% to USD 706 million in FY 23, attributed primarily to a more cautious investment climate that started to focus on more mid-stream mature agritech startups and later-stage funding rounds. The same story is being witnessed in the AgWaterTech landscape, with only 2-3 major deals being conducted in the past two years. Active investors in Indian AgWaterTech startups include Omnivore, Villgro, Acumen, etc.

A key question is how investment theses align with various business models and investor types. For instance, venture capital may favour scalable, high-growth AgWaterTech startups, while private equity might focus on established firms seeking expansion. They are focused on rapid scaling, which is often misaligned with the sector’s slower adoption cycles. Understanding these dynamics is crucial for attracting the right capital to drive innovation and scale in the sector.

C. Debt

Along with government funds, debt is one of the key sources of capital for early stage AgWaterTech startups, particularly those in the hardware domain like sensors. Unlike equity, debt allows startups to focus on stable, but slower growth. Since India's fragmented farmer landscape makes it nearly impossible to scale up rapidly without burning funds, debt's role in enabling market traction and realisation in the early stages cannot be understated.

India's debt investment landscape is vast, but high lending rates remain a major challenge. With base lending rates ranging from 8.85% to 10.10%, borrowing costs can be prohibitive, particularly for startups and SMEs. The share of unsecured loans in total credit extended by scheduled commercial banks has also grown steadily since March 2015, reaching 25.5% by March 2023. This increase has raised concerns about asset quality, leading to tighter lending conditions.

While specific data on debt capital acquired by AgWaterTech startups is unavailable, there are some providers like Caspian which offer debt capital to this segment.

D. Impact capital

Impact capital broadly covers either purely philanthropic capital that is focused on extending technology access to small farmers, or impact investments.

The former largely focuses on localised projects that enable the deployment of technologies for smallholder farmers that can improve their yields / incomes. Examples include The Adani Foundation's collaboration with ACC to implement water-conserving micro-irrigation sprinkler systems in the water-scarce Yavatmal district of Maharashtra.

Additionally, organisations like HUF, DCM, and ITC have contributed to AgWater initiatives using philanthropic capital, enabling valuable on ground interventions. These efforts are often designed as structured programs with specific goals, which may require startups to align with broader implementation frameworks rather than solely focusing on their core business models.

On the other hand, impact investments are also focused on obtaining returns, and hence, become more viable while scaling up a solution with proven impact. In particular, impact investors that focus on environmental impacts like water savings could become a viable source of capital for startups with a strong water story.

E. Blended finance

Investing in AgWater requires a blended capital approach due to its long gestation periods, fragmented ecosystem, and policy dependencies. Blended finance projects are largely being used to catalyse and de-risk innovations in the larger agritech space, but examples in the irrigation domain are still few. Globally, there are point cases like Morocco's Sustainable Irrigation Project, where the International Finance Corporation (IFC) has partnered with Banque Centrale Populaire (BCP) and Compagnie Marocaine de Goutte-à-Goutte et de Pompage (CMGP) to promote micro-irrigation and solar-powered watering systems in Morocco through a $36 million risk-sharing facility.

While specific examples of blended finance projects in India's irrigation agritech sector are limited, there is a growing awareness of the role that can be played by such instruments in unlocking capital. Initiatives like the Inclusive Agritech Facility (IAF), launched in 2018 with support from the Bill & Melinda Gates Foundation, aim to de-risk early-stage investments in agritech companies in India, Nepal, and Bangladesh and may encompass irrigation technologies.

[5] *India private banks see higher levels of small loan defaults until mid-2025*

3.3 Why aren't they investing?

Investments in AgWaterTech startups are low due to a variety of interdependent factors, but there are three in particular that we would want to highlight.

A. India's agricultural landscape mostly consists of small and marginal farmers

As per India's Agriculture Census 2015-16, 86.1 percent of Indian farmers are small and marginal, i.e. they own less than 2 hectares of land. These farmers also make up a bulk of the agricultural water consumers, but there are a significant number of challenges to developing solutions that can lower their water consumption.

The first challenge lies in developing solutions that target crops grown by small farmers. Cereals such as rice and wheat, and other cash crops like sugarcane and cotton are largely grown by this base, but a bulk of solutions for reducing or managing agricultural water use are targeted at horticultural crops.

Even when solutions exist for cereals or cash crops, they are often difficult to monetise, which is the second and probably most important challenge. Small holders are still some of the poorest people in the country, earning only 39% of the income earned by medium holding farmers (2-10 ha) and 13% of the earnings of large holder farmers (>10 ha). A number of solutions that are being developed, even when targeted to small farmers, are not affordable enough by their standards. This challenge is further exacerbated by a lack of incentive for the farmer to care about water use. Government schemes and subsidies often reduce or even eliminate the cost of extracting or using water, which not only leads to rampant overuse but also reduces the farmer's desire to adopt solutions that can tackle the issues that result from it. Given their already low incomes, farmers are unwilling to spend extra on AgWaterTech solutions, unless they can enable a growth in incomes through improved yield or reduced costs of cultivation. Additionally, attribution is another key issue for AgWaterTech solutions, as it is difficult to regress the quantum of yield or productivity improvements down to applied water, given yield or productivity is dependent on a host of connected practices. Lastly, technology solutions may appear to be too complex or different from their traditional farming practices, which also affects their adoption and eventually, their revenue potential.

The last challenge lies in the fragmented nature of India's farming landscape but is covered in more detail as we discuss the next factor that impacts investability.

B. AgWaterTech startups have longer gestation periods and time to returns

Like all Agtech startups, AgWaterTech startups are also impacted by the reliance on crop cycles. A typical crop cycle can last several months from planting to harvest, which affects funding in different ways. First, the extended duration between initial investment and financial returns can deter investors seeking quicker profits. This delay makes it challenging for startups to demonstrate rapid success, potentially leading to reduced funding opportunities. Longer crop cycles also expose farmers and investors to prolonged periods of risk, including adverse weather conditions, pest infestations, and market price fluctuations. Lastly, sustaining operations over long crop cycles often requires substantial capital to cover ongoing expenses such as labor, inputs, and technology maintenance.

These factors contribute to AgWaterTech being less attractive to investors and often lead to startups struggling to secure the necessary funding to support these extended operations.

Additionally, smallholder farmers are present in pockets across the country, which makes it extremely difficult for startups to scale up. This fragmented landscape leads to distribution challenges that make it difficult to lower customer acquisition costs for startups. Most products require in-field education and after-sales support, fulfilling which requires additional capacity development and thus, costs for the startups. These factors also increase the time taken to achieve growth. Formal partnerships between startups, large corporations and civil society actors can address these challenges, but there are few such examples in India.

On average, SaaS companies took 9 years to exit. Social media companies, marketplaces, and content distributors exited within 7 years on the median, while payment companies have taken 4 years. Most of these companies have exited after obtaining Series B to D funding. Our analysis of AgWaterTech startups has shown that the majority are still at the seed stage, despite being operational for 7-10 years or more. Exit challenges in AgWater further complicate investment, with M&A emerging as a more viable pathway than IPOs, provided large agribusinesses or climate-focused funds see value in acquiring AgWaterTech startups.

In summary, AgWaterTech start-ups require a longer time frame for returns on investment and exits compared to other sectors, which in turn impacts their investability.

C. There is a lack of data on agricultural water consumption

In India, there is a lack of comprehensive data collection at the farm level on water use in agriculture, which makes it difficult for start-ups to develop effective solutions and convince investors of their potential impact.

Emerging technologies need data, and it must be the right data, for the right purpose at the right time. This is how it can deliver maximum impact. Agricultural value chains comprise a complex system of stakeholders and activities. The enormity of the size and complexity of agricultural data, coupled with its fragmented nature, pose significant challenges to unlocking its potential economic value, estimated at USD 65 billion in India alone.

The wide span of agricultural data extends to land, soil, seed, crop, weather, pest, good agricultural practices, quality, market, and logistics. Tools like mobile phones, sensors, and satellites have made agricultural data collection more intensive and ubiquitous. Most of these datasets, however, remain siloed, and the systems managing them are not interoperable. Sharing data is limited.

The domain of digital agriculture also doesn't have commonly accepted standards for creating, sharing, analysing and integrating data. Issues such as lack of common vocabularies and the use of different formats for collecting the data hinder data sharing. There is also a lack of a commonly agreed methodology to collect data on water use.

Lastly, most agricultural data is dynamic. Real-time data is required to monitor crop health, adopt best agronomic practices, predict and mitigate pest and disease conditions and natural disasters, optimise the use of resources, overcome productivity plateaus, address the quality concerns of consumers and respond to dynamic or volatile market conditions.

Policy reforms are needed to correct these distortions, but innovative emerging technologies like artificial intelligence, machine learning, distributed ledger technologies, sensors, and drones, can make a significant difference in solving India's agricultural water data problem.

Annexure I

Glossary of Terms

Term	Definition
AgWaterTech	*AgWaterTech at Prize encompasses emerging technologies at the intersection of agriculture and water, aimed at optimising water use as a limited public resource, increasing crop yield, and supporting farmers in adopting sustainable practices across crops to improve farming efficiency and resilience. This includes innovations in the space of bio-inputs and stimulants, sensor-based technology, irrigation automation, and more, helping fulfil the ever-growing needs of the farmer population while tackling some of the impacts of climate change.*
Irrigation water use efficiency	*In irrigation, Water Use Efficiency (WUE) represents the ratio between effective water use and actual water withdrawal.*
Smallholder farmers	*Crop farmers with land sizes of two hectares or less.*
Irrigation-fed farmers	*Irrigation-fed farmers are those who rely on a controlled water supply through irrigation systems to cultivate their crops.*
Rain-fed farmers	*Rain fed farmers depend solely on rainfall for their crops, with no additional irrigation provided.*

Annexure II

Methodology

1. We followed a step-by-step approach to build the case for investability in AgWater in India and estimate the average funding required for startups to scale and maximise impact.

Landscape of Agriculture and Water (AgWater)

As a first step, we analysed the AgWater space, examining technology innovations and funding trends over recent years through reports and existing literature. We then categorised these innovations by solution type - bio-inputs & stimulants, soil moisture and climate sensors, satellite and aerial remote sensing, and automated irrigation systems.

Average Funding Amount

Next, we estimated the funding requirements at various stages for different categories of tech startups in the AgWater sector in India using a guesstimate approach. The approach is based on the following assumptions:

1. Focus on Smallholder Farmers:
The primary target beneficiaries are smallholder farmers.

2. Diverse Solution Needs:
Each farmland plot may eventually require multiple solution categories.

3. Varying Scale Potential:
Different startup categories have distinct scaling potentials.

4. Cost Differentiation:
Cost structures will vary across startup categories and funding stages, with some shared components.

The guesstimate involved the following steps:

Step 1: Identifying startup categories:
We identified four categories for AgWaterTech startups: bio-inputs & stimulants, soil moisture and climate sensors, satellite and aerial remote sensing, and automated irrigation systems. We used an extensive database from Tracxn and certain Agri reports to refine the categories.

Step 2: Target validation:
Determined a target farmer base to further define the customer market for startups and form the foundation for all future calculations. The farmer base was critical to analyse market investment dynamics and identify a critical mass at which stakeholders like the government (through subsidies) and corporate investors contribute to expand the farmer base and support the adoption of startup technologies. We examined multiple government policies and schemes to understand farmer density and its implications for AgWater solutions. Additionally, we engaged with various startups in the sector to gather insights from this step onwards.

Current estimate for critical mass of smallholder farmers : 200k (2,00,000)

Step 3: Stage mapping to target farmer base:
Analysed the category-wise market share (farmer share) and the stage at which each startup category would achieve it.

Step 4: Identifying scale potential:

We assessed the scalability potential of startups across different AgWater categories and calculated the farmer reach per startup. Our analysis emphasised startups that have successfully deployed their technologies to a majority of farmers. We focused on those nearing or closing Series A funding and assumed a 25% success rate for startups progressing from the pre-seed stage to Series A.

Step 5: Mapping number of startups in different categories:

The category-wise market share (farmer share) and the farmer reach per startup in each category helped map the number of startups in different categories.

Number of startups in each category = Category-wise farmer share / Farmer per startup

Step 6: Determining average funding amount:

We estimated the startup costs for different categories at various stages (pre-seed, seed, etc.) to calculate the investments needed for their sustainability and scaling. Eg, the cost categories for a startup in the bioi-inputs and stimulants category may include -

- Product development cost (R&D for formulations, lab tests, regulatory compliance, and initial production)
- Field trials and testing cost
- Team building cost
- Regulatory approvals cost
- Go-to-Market (GTM) cost (Customer acquisition through farmer networks, cooperatives, or agribusiness partnerships, outreach campaigns, digital tools, and initial distribution)
- Operational cost

We examined secondary funding data from relevant startups across our categories to assess cost structures and investment needs. Additionally, we engaged with startups from the Seed to Pre-Series A stages to gain insights into their investment requirements and key cost components. The average funding amount across startup categories helped estimate the total funding required for each category and the sector as a whole. This analysis also enabled an evaluation of available funding types and their alignment with startup needs across categories and stages. While identifying first-movers and risk-takers for each category at different stages remains challenging, the guesstimate exercise provided valuable insights to chart a clearer path forward.

2. To estimate the current market size of irrigation technologies in India, focusing on biologicals and smart irrigation systems (excluding micro and drip irrigation), we began by reviewing some existing literature to gather data on the adoption rates of these technologies among Indian farmers. We then applied a compound annual growth rate (CAGR) of 15% to project the market size for the year 2035. This growth rate was chosen based on factors such as increasing water scarcity, government initiatives promoting precision agriculture, and the declining costs of relevant technologies. This methodology allowed us to arrive at a projection of the market's potential expansion over the next decade.

Annexure III

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India's AgWater landscape is marked by urgency, complexity, and emerging promise. Volume 1 captured where we stand today and how innovation is beginning to respond. But diagnosing the problem is only the first step.

Volume 2 charts the road ahead exploring how India's AgWater future can be transformed by turning potential into scale, innovation into impact, and identifying where the next big bets could be made.